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ABSTRACT

As one in a series of test item collections developed by the Assessment and Evaluation Unit of the Directorate of Studies, items are made available to teachers for the construction of unit tests or term examinations or as a basis for class discussion. Each collection was reviewed for content validity and reliability. The test items meet syllabus content and aims best suited to multiple choice questions, but teachers are meant to base the use of the test items on student ability and the particular program objectives in grades 7 through 10. The test items in geology are presented in sections on soils, weathering and erosion, minerals, rocks and geological structures. Mapping, history and fossils, and resources complete the volume. There are 272 test items. Answers are provided with each item and drawings illustrate many questions. (CM)

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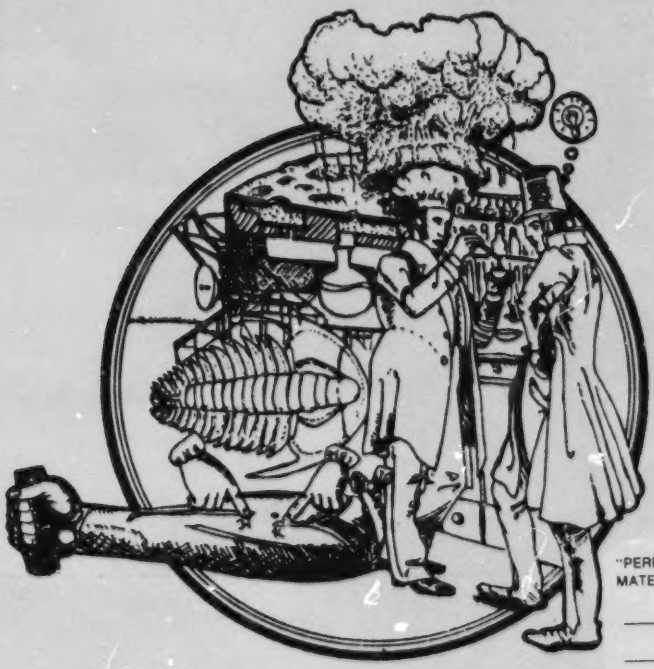

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A COLLECTION OF MULTIPLE CHOICE TEST ITEMS RELATING MAINLY TO

GEOLOGY

TM 820 318

VOLUME NINETEEN OF THE SCIENCE LIBRARY OF TEST ITEMS

ISBN - 0 - 7240 - 5837 - 0

VOLUME NINETEEN OF THE
SCIENCE LIBRARY OF TEST ITEMS

GEOLOGY

Also in this series....

Volume 17	BIOLOGY
Volume 18	CHEMISTRY
Volume 20	PHYSICS (1)
Volume 21	PHYSICS (2)
Volume 22	SKILLS

Produced by the
School Certificate Development Unit
Directorate of Studies
Department of Education
New South Wales
1981

INTRODUCTION

This is the third in a six volume series of multiple choice questions for the Science Library of Test Items.

This volume contains all the items from Volumes 1 and 2 which are related to Geology as well as all the new items currently available.

As with the other items in the series, this volume does not intend to be a comprehensive collection of items relevant to any particular course or syllabus. It is simply a collection of items which have survived the reviewing and pretesting procedures to which all items are subjected.

The collation of the "old" and "new" items into this one volume has highlighted many gaps in the collection and it is towards these deficiencies that future item bank development will work.

The filling of the gaps relies upon contributions by teachers such as those listed in the acknowledgements. If you are interested in becoming a (paid) item writer then contact:

The Subject Officer (Science),
School Certificate Development Unit,
Directorate of Studies,
BOX 460 G.P.O.
NORTH SYDNEY 2006

We are particularly interested in hearing from teachers who have developed stimulating teaching units and corresponding test items. So, if you have a teaching unit not covered by the item collection, write and let us know so that between us, we can spread the information.

Acknowledgements

Many teachers have been involved in developing the library of test items. As with any list of credits, there will always be some who are inadvertently overlooked. To these we extend our apologies.

Those who appear in our files, in alphabetical order, appear in the list below. To these, our thanks and appreciation for work done and the hope that we will continue to receive your support in the future:

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J.F. WHEELDON	Wagga Wagga High School

And a special thanks to the girls at S.C.D.U. who have typed without (audible) complaint as we have constantly changed question after question.

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Peter MACINNIS
Kevin MOLYNEUX
Brian SHADWICK
Jim STAMELL

DEVELOPMENT OF THE LIBRARY

This collection of material is intended as a resource to assist teachers to implement and evaluate courses in the first four years of secondary school.

Because the questions were submitted by classroom teachers from both Government and non-Government schools in all parts of the State, they constitute a cross-section of the ideas which currently pervade classroom practice.

To ensure quality in the collection, only those items which satisfied several quality control checks have been included. Foremost among these were:

(i) inspection by a panel of experienced, practising teachers;

(ii) a pretest with a representative selection of Years 7-10 students.

As well as sharing in the general editing and reviewing functions, the review panels checked each item for *content validity*. The pretest was used to establish the *efficiency* of the items as measuring instruments. Three of the major statistical criteria used were:

(i) Item Facility: The facility index measures the proportion of the sample candidature who answered the question correctly. All items in this collection have a facility index between 0.30 and 0.90.

(ii) Item Discrimination: This index measures the degree to which success on the item is correlated with success on the total test of which the item is a part. A commonly used index of discrimination is the point-biserial correlation coefficient. Every item in this collection attained a point-biserial correlation coefficient of at least 0.20. This means that on the pretest, each item added significantly to the total score of information about the relative achievement of the candidature.

(iii) Distractor Efficiency: With each item, each distractor was chosen by at least 5% of the total candidature, except in the case of very easy items, where an even spread of respondents was sought.

For the test to be *reliable*, many features apart from these three must be considered. However, the proven quality of these items, as measured by these three criteria, makes it highly likely that any test chosen from this collection, and administered to *appropriate* classes, will be a more reliable instrument than teachers could normally produce without this assistance.

USING THE COLLECTION

Items in this collection may be reproduced for classroom use in any form desired by the teacher. To facilitate the preparation of printing masters particular attention has been given to both the diagrams and the layout of the items.

To assist the teacher, the items have been classified according to the content being tested and two pieces of information are provided:

(i) the key (or correct option), and;

(ii) the difficulty rating (1-5), which is based on the data obtained during the pre-testing program. A question rated "1" was correctly answered by some 30-40% of students, while "5" indicates a correct response by 80-90% of students in the pre-test sample. Recent investigations have shown that while this information is useful as a general guide, item difficulties vary greatly when items are given to classes who have recently studied the material covered in given items. The ratings should not be confused with norms or goals: they are merely useful guidelines for teachers.

It is suggested that items might be used for the following purposes:

1. As a source of items for short unit tests.
2. As a source of items for term tests.
3. As a source of ideas for in-school item construction.
4. As a basis for class discussions (it should be noted that stimulus material was NOT designed for use with the overhead projector. The letter size used in typing items would not be legible at more than 4 metres from the screen in an average classroom).

One important warning should be given to all teachers using this collection. Some areas of syllabus content and some syllabus aims are better suited to testing with multiple choice items than others. Consequently, this collection is unlikely to be balanced in its coverage. In addition, the inclusion of an item is not intended to imply that a particular piece of content or teaching strategy has a place in the curriculum. The final selection must lie with the teacher in the classroom who knows the interests and abilities of his students.

Comments, criticisms and suggestions from teachers are welcome. All correspondence should be addressed to :

The Subject Officer (Science),
Directorate of Studies,
Box 33 G.P.O.,
SYDNEY. 2001.

CONTENTS

The contents list which follows gives only broad topic headings, but because the collection is relatively small these should suffice to give teachers access to suitable items for test construction.

It is not intended that class tests be compiled only from items in this collection. There will undoubtedly be areas which the collection does not cover and teachers will need to write their own questions in these areas.

Hopefully, however, this collection will save some teachers some time in preparing tests.

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SOILS
WEATHERING
EROSION

The next two questions refer to the information below.

Four soils were tested to determine the amount of water which

a) stayed on the surface.
b) stayed in the soil.
c) passed through the soil.

The results, expressed as percentages were as follows:

	SOIL A	SOIL B	SOIL C	SOIL D
% staying on surface	100	50	10	20
% staying in soil	0	5	20	0
% passing through	0	45	70	80

Which soil (A,B,C or D) is probably most suitable for plant growth?

C.4 1

Which soil (A,B,C or D) would contain the greatest amount of clay?

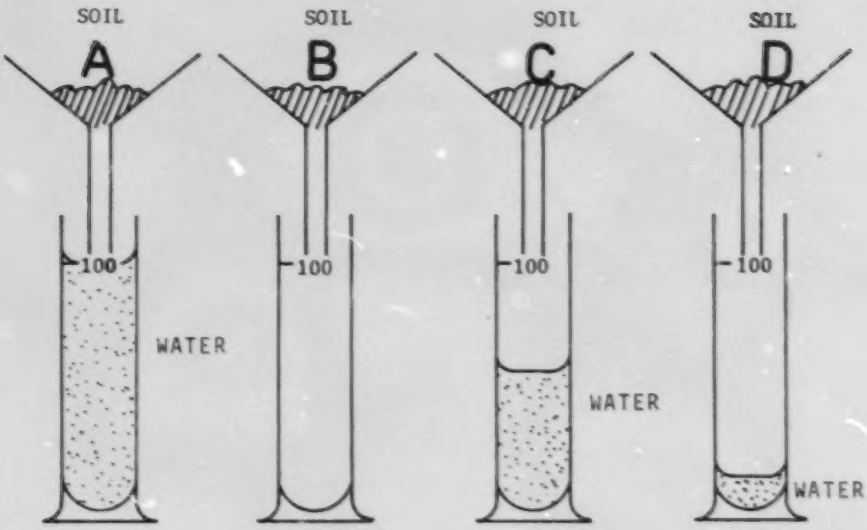
A.3 2

Wind erosion of land surface is typical of

A. humid regions.
B. arid regions.
C. swamp regions.
D. lake regions.

B.3 3

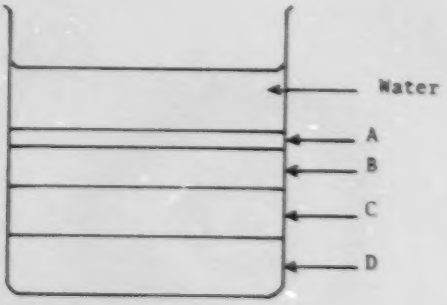
The next question refers to these diagrams.



50g of four different soils, (A, B, C, D) were placed in four separate filter funnels. 100mL of water was poured into each filter funnel, and the water passing through the soil was collected in a measuring cylinder as shown.
Sandy soil is known to <u>retain</u> very little water. Which of the soils above (A, B, C or D) could be a sandy soil?

A3.

A student thoroughly stirred particles of different sizes in a beaker of water and then let the mixture settle. The result is shown in the diagram.



The smallest particles would be found in the layer marked

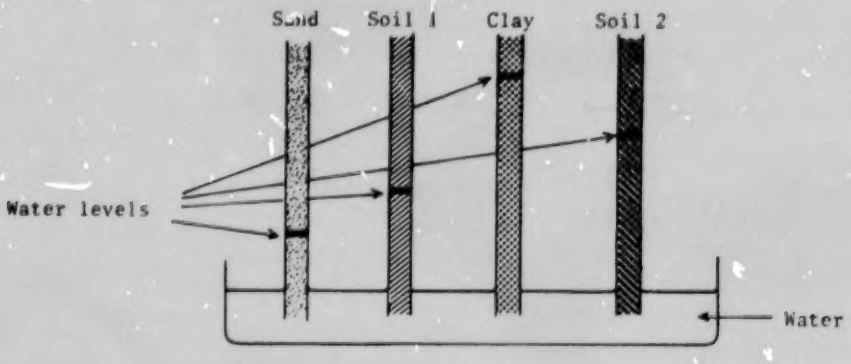
A. A B. B C. C D. D

A.4

5

The next question refers to this information.

The diagram below shows several glass tubes containing various substances immersed in water. The height to which the water has risen is also shown.



What would be the most likely composition of soil 2 compared with soil 1?

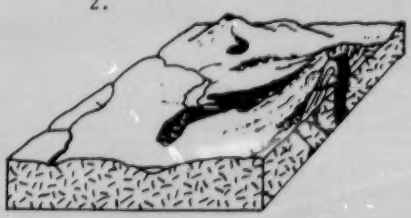
A. Soil 2 has more clay and more sand than soil 1.
B. Soil 2 has less clay and less sand than soil 1.
C. Soil 2 has more clay and less sand than soil 1.
D. Soil 2 has less clay and more sand than soil 1.

C3.

The next question refers to these diagrams of stages in the erosion of a volcanic landscape.

1.

2.



3.

4.

Using all the information which is available in the diagrams, the order of the diagrams, from earliest to latest would be

A. 1, 2, 3, 4.
B. 2, 3, 4, 1.
C. 2, 4, 3, 1.
D. 3, 4, 1, 2.

C2.

The removal of rock and soil material from an area by natural processes is known as

A. deposition.
B. erosion.
C. sedimentation.
D. weathering.

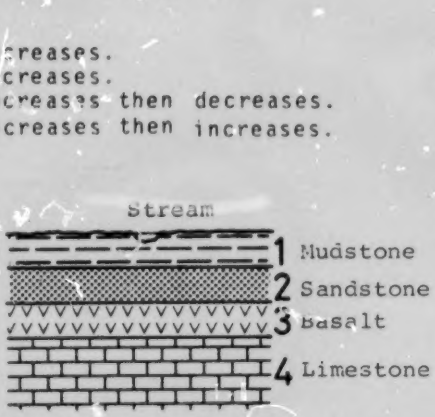
B3 8

The next question refers to the following information.

Answer

A - if the erosion rate increases.
B - if the erosion rate decreases.
C - if the erosion rate increases then decreases.
D - if the erosion rate decreases then increases.

The rates at which the stream will erode the rocks 1, 2, 3 and 4 in turn.



D1 9

Which of the river valley cross-sections below shares the greatest effect of deposition?

A.

C.

B.

D.

B1 10

Scientists believe that there is practically no atmosphere or moisture on the Moon. Which of the following is the most likely cause of the breakdown of rocks on the surface of the Moon?

A. Friction by particles of grit carried by the wind.
B. The formation of ice in cracks in the rocks.
C. Sudden changes of temperature.
D. Running water.

C3 14 11

The breaking down of rocks into smaller particles is called weathering. If chemical changes occur in this process, we call it chemical weathering; if no chemical changes occur we call it physical weathering.

Which of the following is an example of chemical weathering?

A. Water freezing inside cracks in rocks causing them to break.
B. Dissolving of limestone by water containing dissolved carbon dioxide.
C. Wind-carried dust and sand cutting out honeycomb shapes in sandstone.
D. Hot days and cold nights causing layers to split off granite boulders.

B.4 12

The next two questions refer to the following information.

The course of a river can be divided into three parts
1. young stream, in the headwaters or mountain range.
2. mature stream, in the middle region of its course.
3. old stream, where the river is flowing into a sea or lake.

In which region/s will steep V-shaped valleys occur?

A. 1 only. B. 2 only. C. 3 only. D. 1,2 or 3.

A.3 13

In which region/s will delta formations occur?

A. 1 only. B. 2 only. C. 3 only. D. 1,2 or 3.

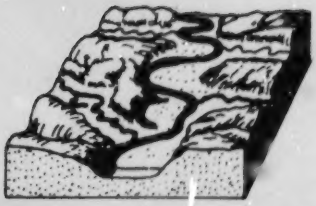
C.3 14

Many weathered rocks and soils are red or brown. This is due to the presence, in the original rock, of

A. iron. B. quartz. C. mica. D. oxygen.

A.3 15

1.



2.

3.

4.

The diagrams show four stages in the erosion caused by a river.
Which order below is correct in time sequence from earliest to latest?

A. 4, 3, 1, 2
B. 3, 1, 4, 2
C. 2, 3, 1, 4
D. 2, 1, 3, 4

C.3

A river can be divided into the following regions:

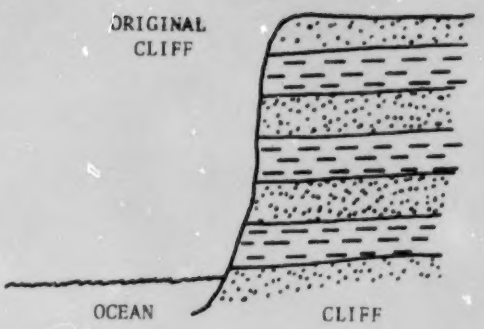
UPPER - has rapids, waterfalls, and narrow valley.
MIDDLE - river bends, wider valley, billabongs.
COASTAL - very broad plain, stream splits and forms islands.
DELTA - region in sea where sediments are deposited.

The region of a river which you would expect the most erosion to occur is

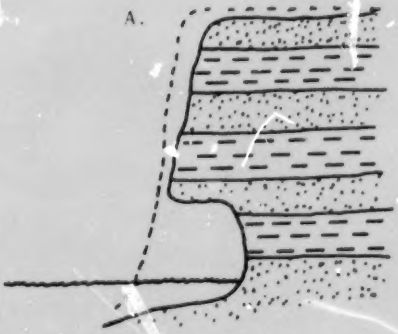
A. upper.
B. middle.
C. coastal.
D. delta.

A.3

It is known that some sedimentary rocks weather more quickly than others. On the basis of this information which diagram below best represents the possible appearance of the cliff (drawn right) after a long period of weathering?



A.



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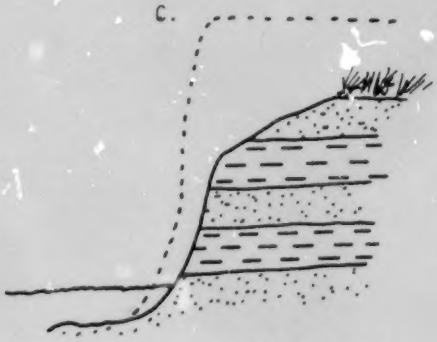
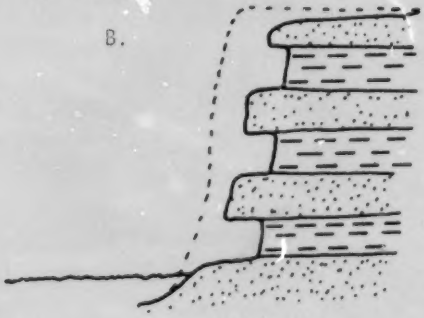
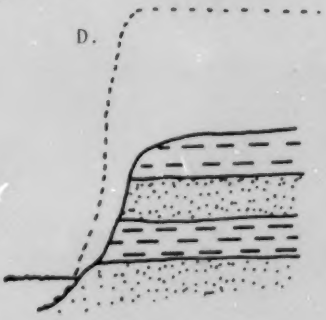


B.



D.



.1

18

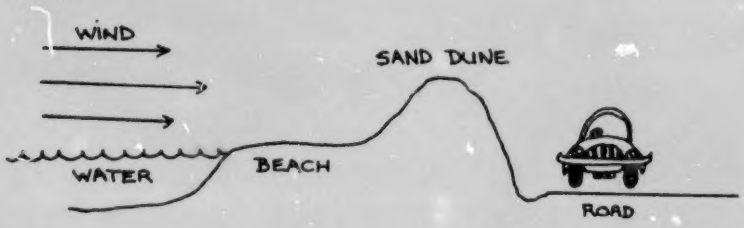
Old rock layers are tilted, folded and faulted by crustal movements and then eroded; at a later time younger rocks are laid down on top of this structure.
The line between the old and young rock is called

A. a fault.
B. an anticline.
C. a syncline.
D. an unconformity.

D.1

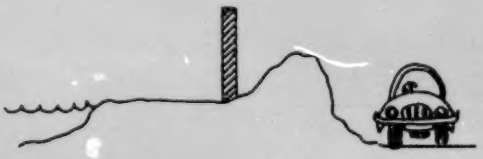
19

Sand dunes along some beaches often "shift" as wind blows them slowly inland, as shown by the diagrams below.



Which solution shown below would be best to use to solve this sort of problem?

A. Build a wall to stop the sand.



C. Build a wind break to shelter the dune.

B. Plant grass on the dune.

D. Keep the sand moist to stop it blowing away.

B3

20

Many cities have been built at the foot of large extinct volcanoes. The main reason for this is that

A. extinct volcanoes are safe because they do not erupt again.
B. extinct volcanoes are usually close to the sea and form good harbours.
C. soil around volcanoes is rich and good for producing food.
C4 D. extinct volcanic craters fill with water and act as the water supply for the city.

21

The next three questions refer to the following statement.

A farmer has fifty acres of hilly land and fifty acres of level land. He wants his farm to be as productive as possible.

In ploughing the fields, the farmer considers the best way is laying out furrows. In order to prevent erosion he should plough so that the furrows will run

A. up and down the hillside.
B. in curves around the slopes.
C. in an east-west direction.
B3 D. at an angle down the hill.

22

After heavy rain the farmer finds a gully forming on the hillside land. The most likely reason for the development of the gully is that before the rain the

A. ground was bare of vegetation.
B. farmer had ploughed the ground in furrows.
C. farmer had planted deep-rooted crops.
A3 D. soil was too rich.

23

The farmer decides that he will use next year's crop to enrich the hillside soil. The best procedures would be to

A. plough the ground very deeply before planting.
B. plant deep-rooted crops.
C. plant clover and plough it under.
C2 D. plant oats and cut them as a hay crop.

24

Scientists have discovered that road surfaces made from a mixture of small chips of hard and soft minerals provide the best grip between car tyres and the road. These road surfaces also last longer.
The most probable reason why these good road surfaces last for a long time is that the

A. small chips weather and become rounded.
B. hard minerals do not weather.
C. hard and soft particles weather differently, maintaining a rough surface.
C5 D. soft minerals become rounded during the weathering.

25

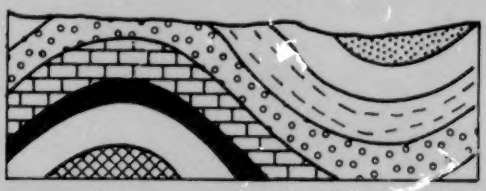
Which of the following processes is the most important in rock weathering in the desert?

A. Chemical attack.
B. Expansion and contraction.
C. Frost wedging.
B4 D. Plant root wedging.

26

The next question refers to these three geological sections.

1



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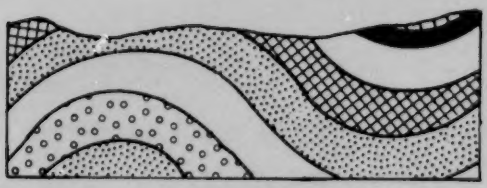


If the diagrams above represent three stages of erosion of the same area, which sequence most logically leads to the present (most recent) stage of the area?

A. 1, 3, 2. C. 3, 1, 2.
B3 B. 2, 1, 3. D. 3, 2, 1.

27

Large boulders are often found scattered on the ground in deserts. The stones or gibbers are there because

A. large meteor showers have dropped them.
B. strong desert winds have blown them.
C. sand grains are melted together on hot days forming them.
D4 D. the sand and dust have blown away leaving them.

28

Which of the following features would be characteristic of a glaciated region?

A. Mesa. C. Undercutting cliffs.
B1 B. Moraine. D. Overlapping spurs.

29

Valleys which are U-shaped, like the one in the following drawing, are caused by

B3 A. fast-flowing streams. C. high tides.
B. glaciers. D. strong winds. 30

A hanging valley would indicate

D2 A. sea erosion. C. wind erosion.
B. river erosion. D. glacial erosion. 31

Where we see granite at the surface we know that since the granite solidified there has been a tremendous amount of

A3 A. erosion. C. folding.
B. metamorphism. D. faulting. 32

Which minerals are most resistant to the process of weathering?

A. Clay, gypsum and diamond.
B. Clay, quartz and feldspar.
C. Feldspar, haematite and galena.
B1 D. Quartz, calcite and fluorite. 33

A compound of aluminium is formed by the weathering of which mineral?

A2 A. Feldspar. C. Haematite.
B. Galena. D. Quartz. 34

The weathering of basalt produces

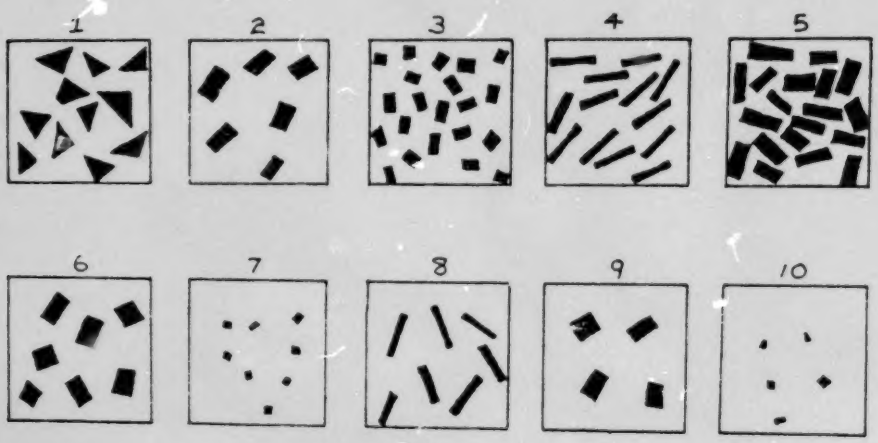
D1 A. infertile sandy soil. C. fertile sandy soil.
B. infertile clayey soil. D. fertile clayey soil. 35

MINERALS

The next four questions refer to the diagram and information below.

Identifying rocks often depends on estimating the percentage of each mineral present.

Look at the diagram below and answer the questions which follow.



1. Which square has a black spot percentage of 10%?

A. 2
B. 3
C. 4
D. 5

A5. 36

2. Square 5 has a black percentage closest to

A. 30
B. 50
C. 70
D. 90

B1. 37

3. Which of the squares mentioned below has the greatest percentage of black?

A. 1
B. 3
C. 4
D. 5

D5. 38

4. Which squares mentioned below have the same percentage of black colouring?

A. 2 and 3.
B. 2 and 6.
C. 5 and 6.
D. 7 and 10.

B4. 39

The specific gravity of a mineral is its weight relative to water.
Geology textbooks give the value of the specific gravity of quartz as 2.65 (an exact value). For the mineral feldspar, the value is quoted as a range: 2.56 to 2.74.
The best reason for this is that

A. not all feldspars are the same.
B. it is difficult to measure the specific gravity of feldspars accurately.
C. the specific gravity of quartz has been measured once only.
D. feldspars have different colours.

A.3 40

Four white minerals were tested for hardness by scratching them with a copper coin of hardness 4.
All four specimens were easily scratched by the coin.
A conclusion which could be drawn from this is that

A. most white minerals can be scratched by a copper coin.
B. minerals with hardness 5 will not be scratched by a copper coin.
C. the four minerals tested have a hardness of 4.
D. these minerals are softer than a copper coin.

D.3 41

A mineral specimen has the following properties:

Colour : grey
Streak : grey
Lustre : metallic
Specific gravity : 7.4
Crystal shape : cubic

The mineral is probably

A. quartz.
B. galena.
C. calcite.
D. haematite.

B.1 42

Consider Moh's scale of hardness.

Hardness	Mineral	Hardness	Mineral
1	Talc	6	Orthoclase
2	Gypsum	7	Quartz
3	Calcite	8	Topaz
4	Fluorite	9	Corundum
5	Apatite	10	Diamond

A student examining a rock noticed that it contained a mineral X. He further noticed that the mineral could be scratched by quartz, but would not scratch orthoclase. Mineral X would scratch apatite and could be scratched by quartz. X is most likely to be

A. apatite.
B. orthoclase.
C. quartz.
D. topaz.

B.3

43

One of the properties used to classify minerals is their hardness. A mineral is said to be harder than a substance if it is able to scratch that substance.

The mineral, calcite, is able to scratch your fingernail but not a 2-cent coin. Quartz can scratch a 2-cent.

A list of these substances arranged in order of INCREASING hardness would be

A. quartz, coin, calcite, fingernail.
B. calcite, fingernail, quartz, coin.
C. coin, quartz, fingernail, calcite.
D. fingernail, calcite, coin, quartz.

D.3

44

Four students have a sample of a mineral which they know is either calcite or quartz. Each has a different plan for testing the mineral. Which is best?

A. Place a drop of dilute acid on the sample, and carry out a streak test with a white tile.
B. Place a drop of dilute acid on the sample, and test the sample to see if it will scratch glass.
C. Examine the sample with a hand lens and test the sample to see if it will scratch a copper coin.
D. Hit the sample with a geological hammer and examine a fresh surface with a hand lens.

B2 45

Which list contains three rock-forming minerals?

A. Calcite, quartz, feldspar.
B. Clay, granite, quartz.
C. Limestone, feldspar, mica.
D. Talc, mica, shale.

A2 46

The chemical compound calcium carbonate appears in nature in several different forms.
Which form below is NOT a variety of calcium carbonate?

A. Calcite.
B. Gypsum.
C. Limestone.
D. Marble.

B3 47

A compound of aluminium is formed by the weathering of which mineral?

A. Feldspar.
B. Galena.
C. Haematite.
D. Quartz.

A1 48

Certain beach sands are an important source of

A. calcium.
B. iodine.
C. iron.
D. titanium.

D3 49

Chemical attack by water and atmospheric gases on igneous rocks such as granite converts the minerals to clay, silica and soluble salts. Some unusual minerals are not attacked by the chemicals and are left behind to be concentrated as residuals. Which of the following minerals or ores is concentrated as a residual?

A. Calcite.
B. Feldspar.
C. Gold.
D. Opal.

C4 50

Which metal can be extracted from the mineral galena?

A. Iron.
B. Lead.
C. Silver.
D. Zinc.

B4 51

The total number of minerals on the earth, and the number of commonly-occurring minerals are respectively

A. about 300 000; about 2000.
B. about 20 000; about 200.
C. about 2000; about 20.
D. about 200; about 2.

52

What definition best describes a mineral?

A. A chemical substance containing elements in fixed proportions by weight.
B. A chemical compound which can be mined and converted to various metals.
C. A naturally occurring chemical compound or element.
C3 D. A compound containing precious metals found in mines and ore bodies.

53

Which mineral has the chemical composition indicated by the formula SiO_2?

A. Galena.
C1 B. Mica.
C. Quartz.
D. Talc.

54

Which of the following substances is a mineral?

A. Calcium.
B1 B. Quartz.
C. Glass.
D. Granite.

55

Many properties of minerals can be used to distinguish one mineral from another. Which one of the following properties is the most useful to identify common minerals?

A. Colour.
C3 B. Fracture.
C. Hardness.
D. Streak.

56

Some minerals have a diagnostic or characteristic physical property which enables the mineral to be readily identified. Select from the matched pairs below the mineral whose property listed is <u>not diagnostic</u>.

A. Diamond - hardness.
B. Feldspar - cleavage.
C. Galena - streak.
C1 D. Opal - colour.

57

Which two ores below are both ores from which iron can be obtained?

A. Bauxite and galena.
B. Bauxite and haematite.
C. Galena and magnetite.
D3 D. Haematite and magnetite.

58

Which of the following elements is the most abundant in the Earth's crust?

A. Aluminium.
D2 B. Iron.
C. Oxygen.
D. Silicon.

59

Imagine you wished to identify the mineral calcite in a rock. Two useful pieces of equipment which would enable you to do this would be

A1
A. hand lens, pen knife.
B. streak plate, magnet.
C. streak plate, hand lens.
D. hand lens, magnet.
60

When examining some specimens of minerals, it was found that mineral P would scratch mineral R but not mineral Q. If these were arranged in order from hardest to softest, the correct order would be

B3
A. P, Q, R.
B. Q, P, R.
C. Q, R, P.
D. R, P, Q.
61

A geologist made the following observations about a mineral he found:

"It does not scratch topaz and quartz, but could scratch calcite and fluorite."

Using the Moh's Scale of hardness, below, what hardness did he give the mineral?

1.	Talc.	6.	Orthoclase.
2.	Gypsum.	7.	Quartz.
3.	Calcite.	8.	Topaz.
4.	Fluorite.	9.	Corundum.
5.	Apatite.	10.	Diamond.

C
A. 3 or 4
B. 4
C. 5 or 6
D. 8 or 9
62

Which mineral is the hardest?

D4
A. Calcite.
B. Fluorite.
C. Mica.
D. Quartz.
63

Which mineral is most easily scratched by a copper coin?

C2
A. Calcite.
B. Feldspar.
C. Gypsum.
D. Mica.
64

Which of the following properties would best distinguish between a hand specimen of quartz and one of feldspar?

C2
A. Colour.
B. Hardness.
C. Cleavage.
D. Streak.
65

The hardest common mineral, which is often white in colour and has no cleavage planes is?

D1
A. Calcite.
B. Diamond.
C. Muscovite.
D. Quartz.
66

Which mineral has perfect cleavage in one direction?

C2
A. Calcite.
B. Galena.
C. Muscovite.
D. Plagioclase.
67

Which of the following groups of minerals <u>all</u> have two cleavages in some orientation?

A. Hornblende, augite, feldspar.
B. Quartz, calcite, feldspar.
C. Quartz, mica, hornblende.
A1 D. Mica, feldspar, calcite.

68

If you had two minerals, known to be gypsum and calcite, which test would most easily distinguish one from the other?

A. Adding acid.
A3 B. Crystal shape.
C. Hardness.
D. Streak.

69

Which two minerals are always found in granite?

A. Feldspar and calcite.
B3 B. Feldspar and quartz.
C. Quartz and muscovite.
D. Quartz and calcite.

70

Which of the following minerals is most unlikely to be found in a basic (mafic) igneous rock such as basalt?

A. Ferromagnesian.
D3 B. Muscovite (white mica).
C. Plagioclase.
D. Quartz.

71

The table below shows the minerals in the 4 different rocks found in an area.

ROCK	MINERALS PRESENT IN ROCK			
	Quartz	Calcite	Feldspar	Ferromagnesian
Basalt	-	-	✓	✓
Sandstone	✓	✓	-	-
Limestone	-	✓	-	-
Granite	✓	-	✓	✓

(A tick (✓) means that the mineral is present in that rock.)

A student finds a rock in the area and takes it to his teacher for identification. His teacher tells him that this rock formed when molten rock cooled and that it contains quartz. The student uses the above table to decide correctly that the rock is

D4 A. basalt.
B. sandstone.
C. limestone.
D. granite.

72

This question relates to the table below which tells you some of the properties of two minerals X and Y.

PROPERTY	MINERAL X	MINERAL Y
Colour	Red, pink, grey, yellow, white	White
Twinning	Simple	Multiple
Hardness	6.0 - 6.5	6.0 - 6.6
Lustre	Vitreous, dull	Vitreous
Streak	White	White
Specific Gravity	2.5 - 2.6	2.6 - 2.7

If you were given the two minerals, X and Y, the best way you could distinguish between them would be to use

A. all properties listed.
B. colour, twinning and lustre only.
C. colour, lustre and specific gravity only.
D1 D. twinning only. 73

Pure samples of quartz and calcite are presented to a student and he is asked to name them correctly.
Which of the following would be LEAST USEFUL to him in distinguishing between the two minerals?

A. One mineral is harder than the other.
B. One can be split into regular blocks but the other one can't.
C. One mineral reacts with dilute hydrochloric acid and the other one does not.
D1 D. One mineral is clear and the other is milky. 74

Which mineral below is most likely to have a coloured streak?

A. Biotite (black mica). C. Plagioclase feldspar.
B3 B. Haematite. D. Quartz. 75

A mineral that can be identified by its magnetic properties is

A. magnesite. C. malachite.
B3 B. magnetite. D. muscovite. 76

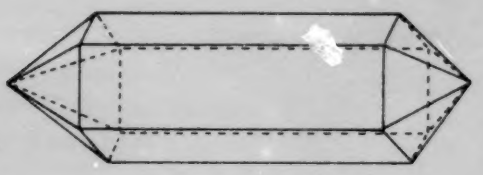
The typical lustres of silicate and sulfide minerals respectively are

A. dull, pearly, C. vitreous, metallic.
C1 B. pearly, vitreous. D. vitreous, pearly. 77

Which mineral is pinkish in colour and has a vitreous lustre with cleavage in 2 directions?

A. Calcite. C. Orthoclase.
C1 B. Fluorite. D. Plagioclase. 78

The next five questions refer to the diagram below.



The mineral quartz forms crystals in the above shape. The crystal is symmetrical. All rectangular faces are identical. All triangular faces are identical.

The total number of faces present in this crystal is

A. 6 B. 9 C. 12 D. 18 79

The total number of corners present in this crystal is

C4 A. 6 B. 12 C. 14 D. 20 80

The total number of edges (i.e. lines where 2 faces meet) present in this crystal is

D1 A. 10 B. 18 C. 24 D. 30 81

The name for this figure is

A. hexagonal bi-pyramid. C. pentagonal prism.
A1 B. octahedral bi-pyramid. D. tetragonal prism. 82

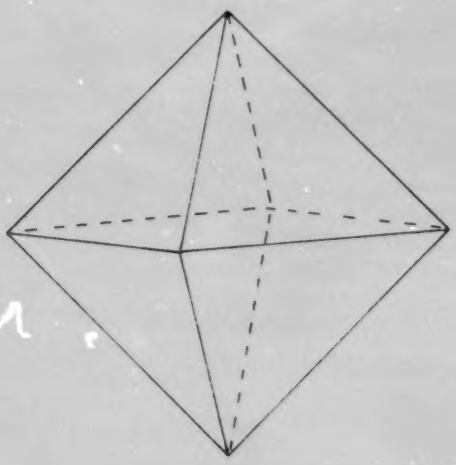
The angle between adjacent rectangular faces is

B1 A. 90^0 B. 120^0 C. 135^0 D. 150^0 83

The mica family of minerals usually occurs as flat or sheet-like crystals in rock specimens. This is probably because

A. the form of mica reflects the internal arrangement of its atoms.
B. as the mineral crystallises from solution it has room to grow in two directions.
C. the weight of overlying strata usually squashes the mica crystals flat.
A1 D. all minerals which form below the surface of the earth are flat or sheet-like. 84

The next four questions refer to the diagram below.



The mineral magnetite forms crystals in the above shape. The crystal is symmetrical and all of the faces have three equal sides.

The total number of faces present in this crystal is

C5 A. 4 B. 6 C. 8 D. 12 85

The total number of corners present in this crystal is

B5 A. 4 B. 6 C. 8 D. 12 86

The total number of edges (i.e. lines where 2 faces meet) present in this crystal is

A. 4 B. 6 C. 8 D. 12 87

The name of this figure is

A. a dome. C. a pyramid.
B3 B. an octahedron. D. a tetrahedron. 88

ROCKS

A good indication of seasonal deposition of sediments would be the occurrence of

A. coarse sandstones.
B. mudstones.
C. varved clays.
1 D. limestone.

89

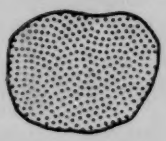
Which one of the following rocks was formed under very calm water?

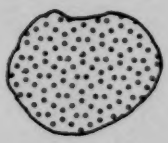
A. Coarse conglomerate.
B. Fine conglomerate.
C. Sandstone.
D2 D. Shale.

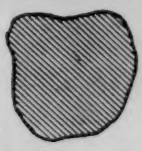
90

Which rock represented by the diagrams below is most likely to have been formed under very calm water?

A Coarse Conglomerate

B  Sandstone

C  Finer Conglomerate

D  Shale

D2

91

The group which contains only sedimentary rocks is

A. limestone, marble, sandstone.
B. calcite, shale, limestone.
C. conglomerate, sandstone, limestone.
2 D. marble, tuff, shale.

92

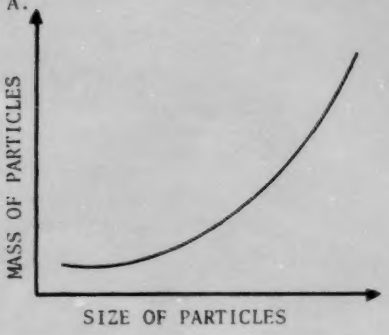
Fine particles of rock, mud and clay, settle slowly from water in lakes and rivers and in the ocean. Accumulations of these sediments eventually result in the formation of a sedimentary rock called

A. chalk.
B. sandstone.
C2 C. shale.
D. slate.

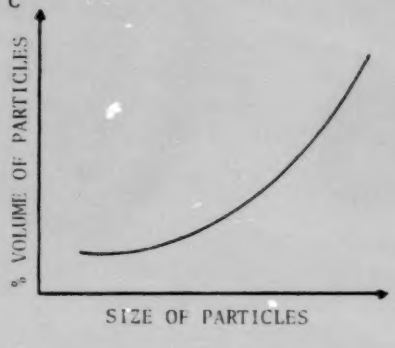
93

Which graph below gives the most useful information in terms of indicating the composition of a sedimentary rock?

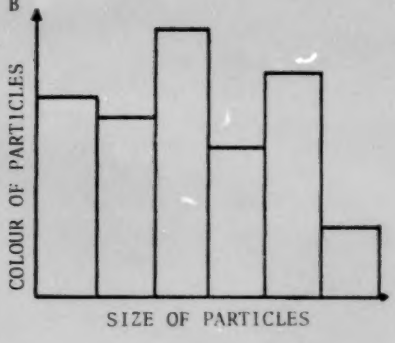
A.



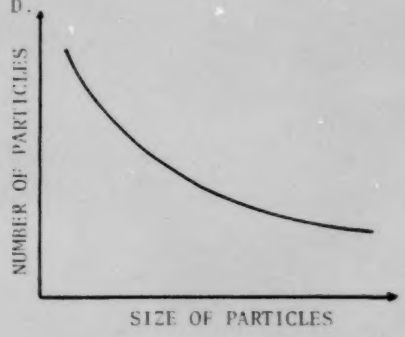
C



B



D.



D1

94

Sedimentary rocks are easily recognised because they are

A. found in mountains.
B. found near volcanoes.
C. usually composed of sand particles.

D3 D. usually found in layers.

95

An area of horizontally bedded sedimentary rocks would most likely have formed where

A. there was an area of volcanic activity.
B. intense mountain building activity had taken place.
C. a shallow sea had existed.

A3 D. intense glacial erosion had taken place.

96

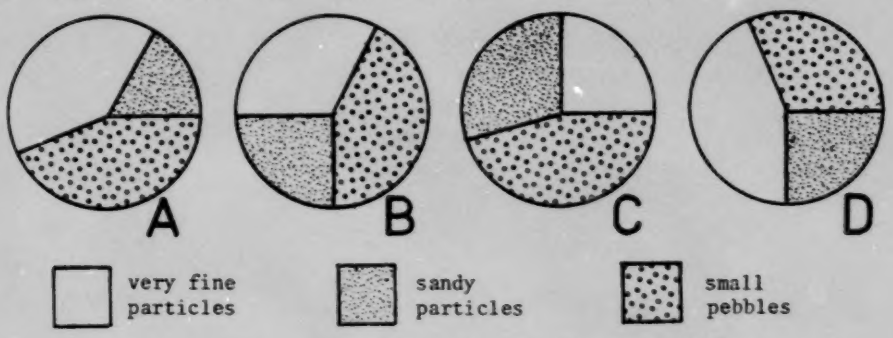
Fine grained sedimentary rocks were probably formed from sediment deposited from a

A. fast flowing glacial stream.
B. still or very slow moving water.
C. water flowing in mountain foothills.

B1 D. water flowing at a steady pace.

97

The next question refers to the "pie" graphs below.

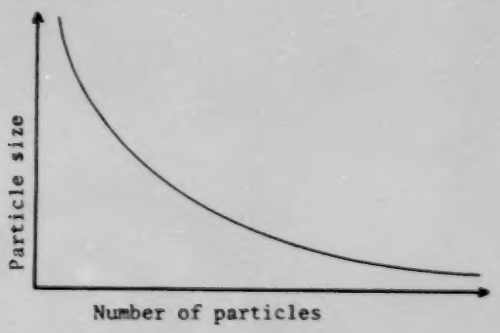


A fine conglomerate was examined and found to be composed of approximately 45% small pebbles, 25% sandy particles and 30% very fine particles.

Which graph above could best represent this conglomerate?

B3. 98

A student observed a small piece of a sedimentary rock with the intention of finding out the sizes of the particles which composed the rock.
He graphed the result as follows:

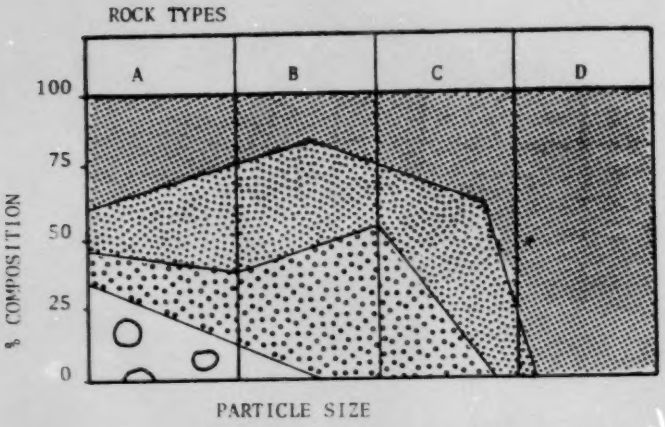


These results mean that the rock he was studying

A. had more large particles than small particles.
B. contained a large number of particles of all sizes.
C. was most probably a sandstone or a shale.
D. was composed of a variety of particles.

D3. 99

The next two questions refer to this information.



KEY

Very fine particles

Sandy particles

Medium particles

Large particles

Which of the rock types, A, B, C or D would best suit a sedimentary rock which was composed of 20% very fine particles, 30% sandy particles and 50% medium particles?

B.3

100

Which rock type best could be named a siltstone?

A. A B. B C. C D. D

D.3

101

The processes by which sediments can be converted to sedimentary rocks are

A. weathering and erosion.
B. cementation and erosion.
C. pressure and weathering.
D. cementation and compaction.

D.3

102

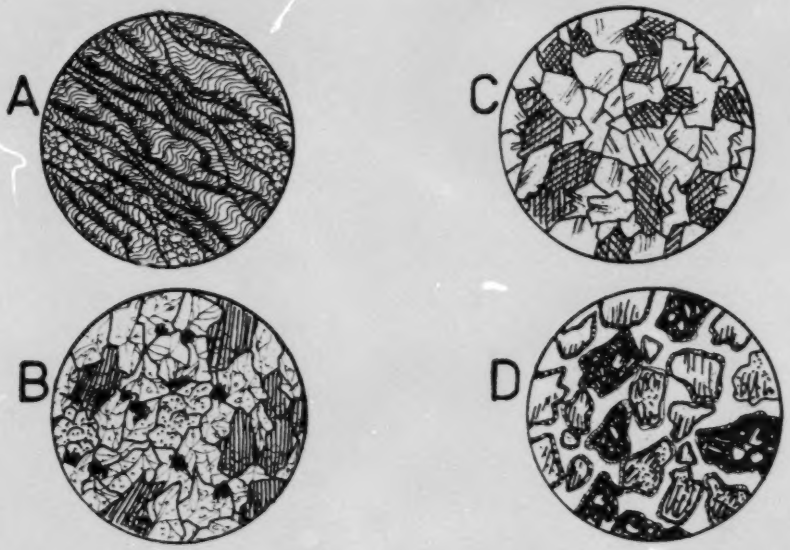
Which of the following is LEAST likely to be a feature of sedimentary rocks?

A. Broken or rounded particles.
B. Particles sorted into layers.
C. The presence of large crystals.
D. The presence of fossils.

C3

103

Wells are drilled into rocks which transport water. The diagrams below show four different rock types as seen under the microscope. By careful observation of the diagrams decide which of the rocks would be most likely to carry water.



D2.

104

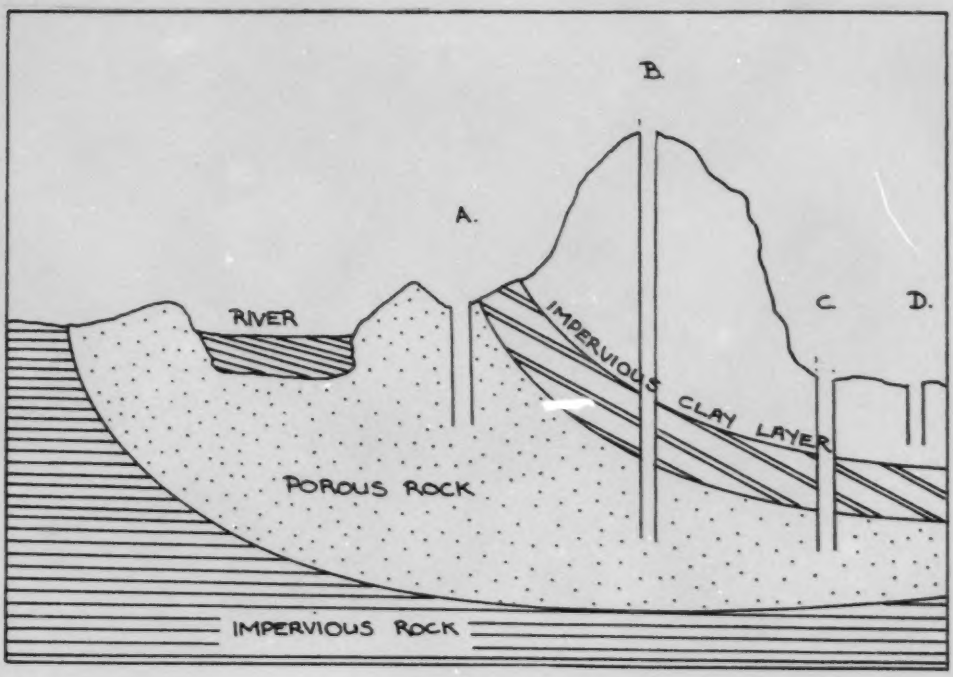
A geologist has decided to analyse some sandstone to find out something about the size of the grains in the sandstone. She will present her results in the form of a graph. Which of these would be the most useful to another geologist?

A. The percentage of particles in each of five ranges of mass.
B. The percentage of particles in each of five ranges of size.
C. The number of particles in each of five ranges of mass.
D. The number of particles in each of five ranges of size.

B1.

105

The next question refers to this diagram.



This diagram shows an artesian basin.
Wells are sunk at A, B, C and D as shown. Assuming that the porous rock is saturated with water, the well from which water will flow freely is

A. A B. B C. C D. D

C1. 106

A rock which is made up predominantly of sharp angular fragments is most likely to be

A. a conglomerate.
B. a volcanic lava.
C. formed as a result of glaciation.
D. found high on mountain ranges.

C3 107

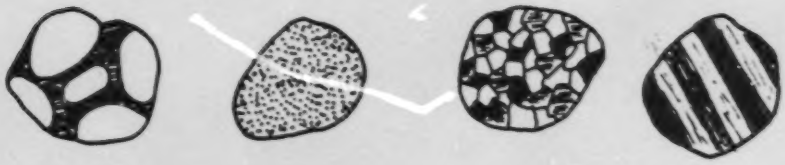
Plant material represents an accumulation of carbon in a variety of compounds. When the plant material accumulates and is covered by sediments, it begins to change and the carbon percentage increases. Which of the following types of coal contains the highest percentage of carbon?

A. Anthracite. C. Lignite.
B. Bituminous coal. D. Peat.

A1 108

Which diagram below best represents the sedimentary rock, sandstone, as drawn by a student, after observing the sandstone with the unaided eye?

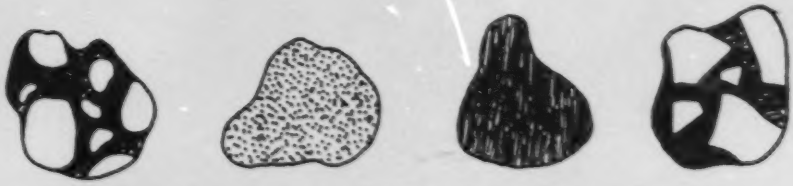
A. B. C. D.



B.4 109

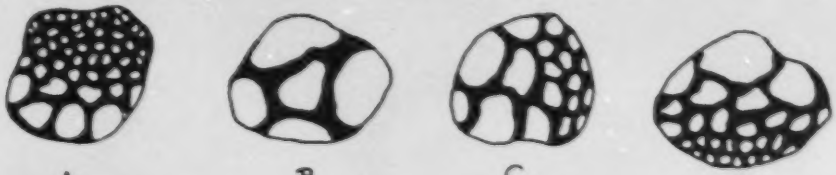
Which of the diagrams below could best represent a sedimentary rock called conglomerate?

A. B. C. D.



A.3 110

Which of the rocks drawn below contains a sedimentary feature which suggests that it has been drawn up-side-down compared with the way it was when it was formed?



D2. 111

Stalactites and stalagmites are geological features found in

A. a glacial valley after the glacier melts.
B. lava flows.
C. limestone caves.
D. underground oil reservoirs.

C.4 112

Which of the following is LEAST likely to be a feature of sedimentary rocks?

A. Broken or rounded particles.
B. Particles sorted into layers.
C. The presence of large crystals.
D. The presence of fossils.

C.3 113

The next two questions refer to the following information.

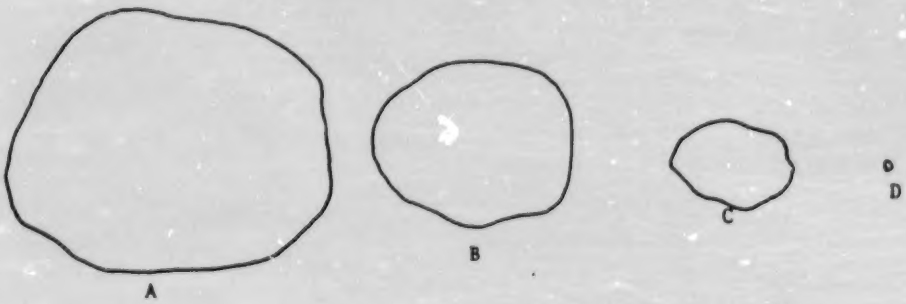
NAME OF PARTICLE	SIZE OF PARTICLE (mm)	ROCK FORMED FROM PARTICLE
BOULDER	> 256	COARSE CONGLOMERATE
COBBLE	64 to 256	MEDIUM CONGLOMERATE
PEBBLE	2 to 64	FINE CONGLOMERATE
SAND	1/16 to 2	SANDSTONE

This particle would, when compacted with many others of similar size, form which rock?

A. Coarse conglomerate.
B. Medium conglomerate.
C. Fine conglomerate.
D. Sandstone.

C.2 114

Which sized rock particle drawn below would form sandstone when compacted together.



A geologist has made these field notes about a stratum (bed) of sedimentary rock:

"Sandstone with very clear ripple marks, cross-bedded, several marine fossils present".

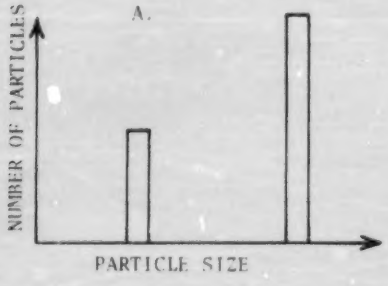
The evidence available in the notes indicates that this sandstone was laid down in a region where

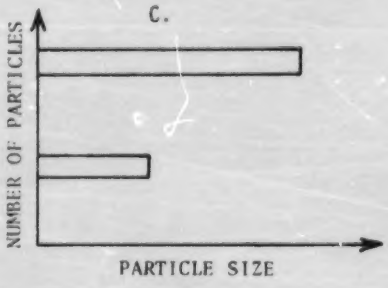
A. there was a large tidal range.
B. the water was quite shallow.
C. the water was very deep .
D. winds blew sand into a salt lake.

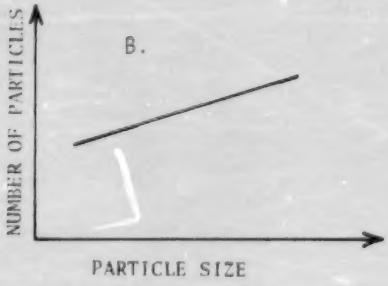
B.2 116

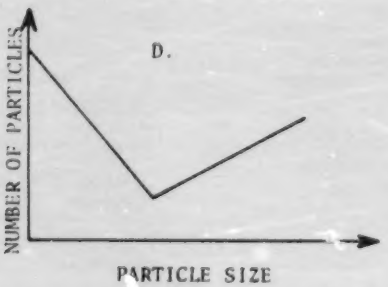
Sandstone consists of particles of sand cemented together with a finer clay type material.

Which graph below most probably represents sandstone?









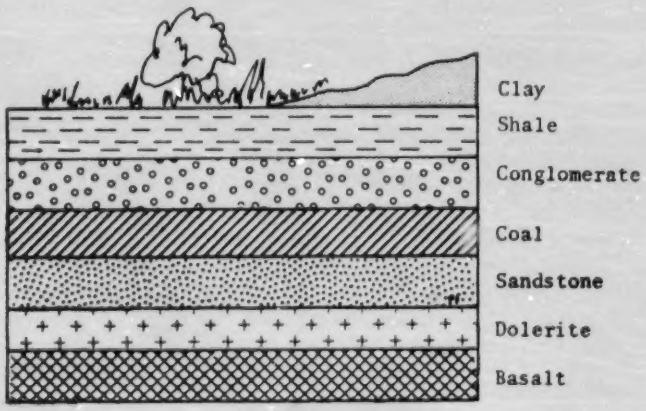
A.4 117

A geology student has four samples of rock. His teacher told him that one of them was formed under very calm water. Which of these four rocks would that be?

A. Coarse conglomerate.
B. Fine conglomerate.
C. Sandstone.
D. Shale.

D.2 118

The next question refers to this diagram.



The diagram shows layers of rock exposed on a cliff face. The oldest sedimentary rock shown is most probably

A. basalt.
B. clay.
C. sandstone.
D. shale.

C.1 119

All rivers carry sediment which may be laid down and later become rock. A rock made of a mixture of large boulders, pebbles and sand may have been DEPOSITED where the river

A. flowed into a lake.
B. was moving very quickly.
C. had overflowed its banks.
D. had formed an estuary.

1 120

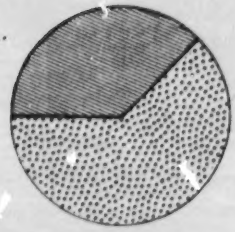
The stages in the formation of coal, in correct order, are

A. peat, lignite, bituminous, anthracite.
B. peat, brown coal, lignite, anthracite.
C. lignite, peat, anthracite, bituminous.
D. lignite, bituminous, peat, brown coal.

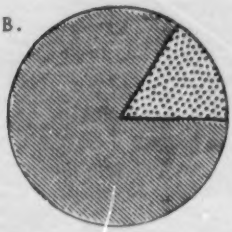
A1 121

Which of the graphs below shows the composition of sandstone as 80% sand particles cemented together with 20% clay?

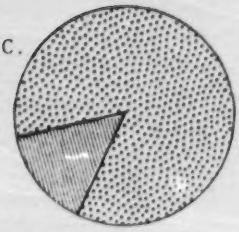
A.



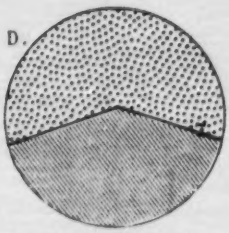
B.



C.



D.



C.4 122

A rock which is formed when water worn pebbles and boulders are cemented together is

A. conglomerate.
B. granite.
C. sandstone.
D. shale.

A5 123

When a drop of acid is placed on limestone there is a rapid fizzing reaction. In which of the following rocks would there be a similar reaction?

A. Gneiss.
B. Marble.
C. Quartzite.
D. Slate.

124

The rock most likely to be formed as a result of glacial action would be

A. breccia.
B. conglomerate.
C. tillite.
D. tuff.

C1 125

A fine-grained igneous rock contains long thin streaks of light-coloured mineral, which on close examination is glass. The rock was most probably formed by

A. rapid cooling of lava from a volcano.
B. slow cooling of a large mass of magma.
C. condensation of rock vapour released from a volcanic explosion.
D. rapid precipitation from the molten rock in a batholith.

A 126

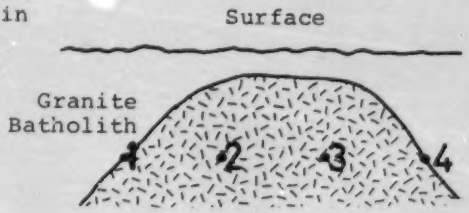
Basalt and gabbro form from the same type of molten material. Gabbro has much larger crystals than basalt, however. This is because

A. basalt crystallised more slowly.
B. basalt is a plutonic rock.
C. gabbro has a high quartz content.
D. gabbro formed deep in the earth.

D1 127

This question refers to the diagram on the right.
If we looked at the crystal size in the rocks in regions 1,2,3 and 4 in that order we would find that the crystal size would

A. increase.
B. decrease.
C. increase then decrease.
D. decrease then increase.



128

A plutonic igneous rock is most readily recognised by

A. its high content of quartz.
B. the presence of black minerals.
C. its coarse crystalline structure.
D. an appearance similar to granite.

C 129

An igneous rock with large crystals would most likely have formed

A. when a volcano threw out clouds of ash.
B. as part of a lava flow.
C. where a volcano erupted under the sea.
D. where magma cooled deep under the earth.

D3 130

In the early stages of the eruption of a volcano, large quantities of volcanic "ash" are blown out. This "ash" settles around the base of the volcano and eventually forms into a rock called

D1

A. conglomerate.
B. lava.
C. pumice.
D. tuff.

131

The chemical composition of magma and lava from the same source differ in that the

B1

A. magma has less dissolved gases.
B. lava has lost the low boiling point compounds.
C. magma is higher in ferromagnesian type minerals.
D. lava assimilates more of the country rock it intrudes.

132

Which rock was most probably a volcanic lava?

A3

A. Basalt.
B. Granite.
C. Sandstone.
D. Slate.

133

The most common volcanic rock to form from volcanic eruptions

A2

A. basalt.
B. volcanic glass.
C. granite.
D. rhyolite.

134

In a region in which lava flows exist, you would expect to find

A1

A. dykes.
B. faulting and folding.
C. honeycomb weathering.
D. granite tors.

135

Basalt is best classified as a

A1

A. fine-grained, dark-coloured volcanic rock.
B. coarse-grained, dark-coloured plutonic rock.
C. fine-grained, light-coloured volcanic rock.
D. glassy, light-coloured plutonic rock.

136

The rate at which an igneous rock has cooled can be generally determined by examining the

D5

A. acidity (amount of silica).
B. mineral composition.
C. number of minerals present.
D. size of its crystals.

137

To determine the rate at which a particular igneous rock had cooled you would look at its

D

A. colour.
B. chemical composition.
C. hardness.
D. grain size.

138

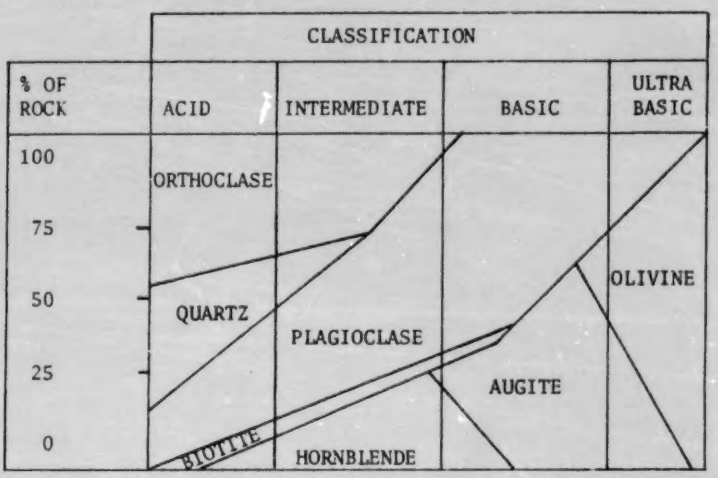
To distinguish between granite and basalt it is most likely that you would observe

B3

A. colour and streak.
B. colour and grain size.
C. streak and hardness.
D. grain size and hardness.

139

The next two questions refer to the diagram below.



A rock which contained mainly orthoclase and plagioclase and hornblende with a small amount of biotite would be classified as

A. Acid.
B. Intermediate.
C. Basic.
D. Ultrabasic.

B.3

140

Given these as the common igneous rock-forming minerals, the most common mineral found in igneous rocks is

A. Orthoclase.
B. Quartz.
C. Plagioclase.
D. Hornblende.

C.1

141

Which of the following pairs contains two plutonic igneous rocks?

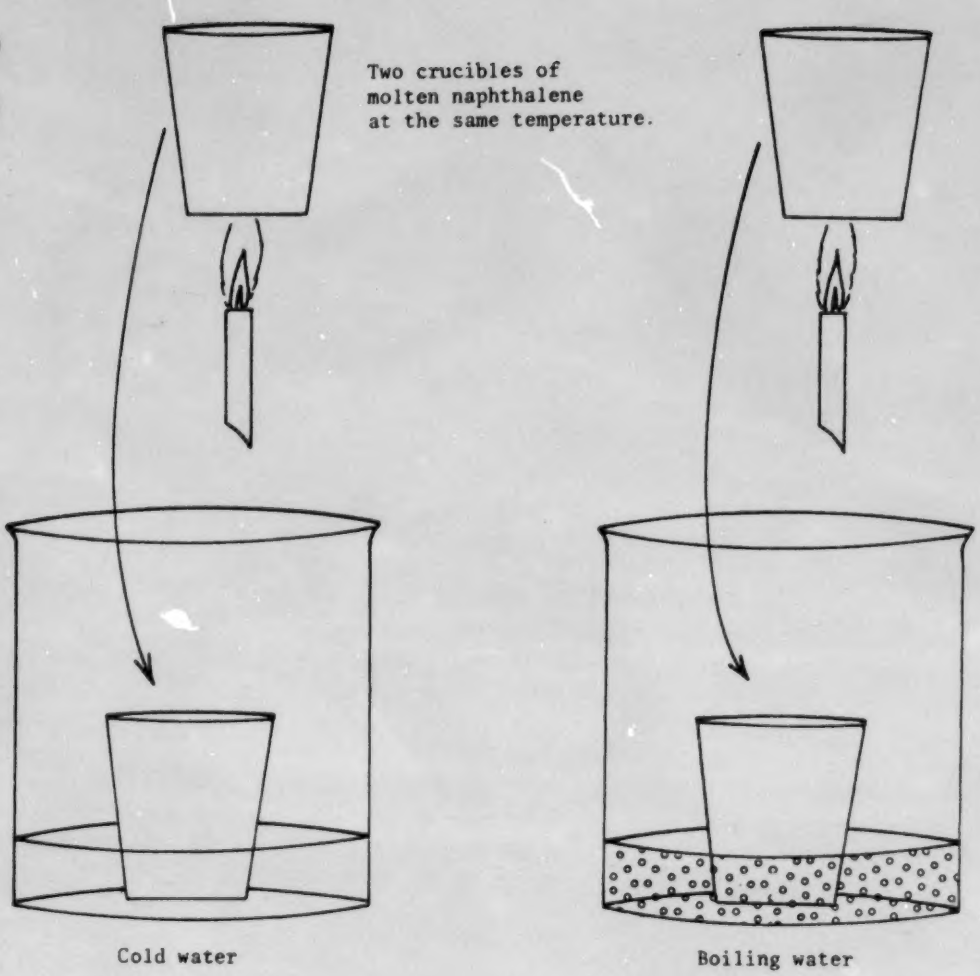
A. Basalt, rhyolite.
B. Gabbro, basalt.
C. Granite, gabbro.
D. Granite, rhyolite.

C

Gabro is best classified as

A. a basic metamorphic rock.
B. an acidic, plutonic igneous rock.
C. a basic, plutonic igneous rock.
D. a fine-grained, volcanic igneous rock.

C1

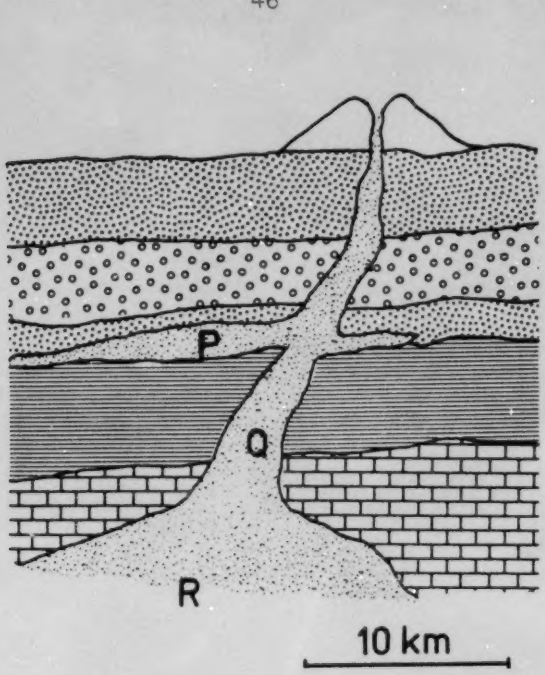


Two crucibles of molten naphthalene (moth balls) were separately cooled as shown above. In cold water the naphthalene formed a glassy solid whilst in boiling water the naphthalene formed large crystals. This experiment helps us understand why

A. sea water dries to form crystals of salt.
B. a crystal hung in its own solution will grow larger.
C. some igneous rocks have different size crystals.
D. water in a freezer forms crystals of ice.

C.1

144



Which choice correctly labels the three structures indicated on the diagram above?

	Batholith	Sill	Dyke
A.	P	Q	R
B.	Q	R	P
C.	R	P	Q
D.	R	Q	P

C.3

145

When molten rock cools crystals of minerals form. The deeper the molten rock is inside the earth's crust, the slower the cooling and the larger the crystals.

Four rocks, which have formed from molten rock are described below:

OBSIDIAN - has glass-like surface.
GRANITE - has large crystals of quartz and feldspar.
BASALT - has small crystals.
PORPHYRY - larger crystals embedded in small crystals.

Of these rocks, the rock you would expect to be the slowest to cool is

A. porphyry.
B. granite.
C. basalt.
D. obsidian.

B.3

146

A metamorphic rock is one which is

A. formed in fast flowing rivers.
B. made up of fragments of other rocks.
C. produced by lava cooling.
D3 D. formed when other rocks are altered. 147

The area of contact metamorphism around an igneous intrusion is called a(n)

A. aureole. C. region.
A1 B. dyke. D. sill. 148

Which of the following pairs of rocks contains only rocks which are formed by heat and pressure affecting shale?

A. Hornfels, quartzite. C. Marble, hornfels.
B2 B. Gneiss, schist. D. Slate, marble. 149

The name of a process in which intense heat and pressure alter sandstone to quartzite is

A. exfoliation. C. sedimentation.
B4 B. metamorphism. D. volcanism. 150

If sandstone is subjected to intense heat and pressure, the grains weld themselves into a compact mass. The rock formed in this process is

A. gneiss. C. quartzite.
C5 B. marble. D. schist. 151

The sequence of schist formation is

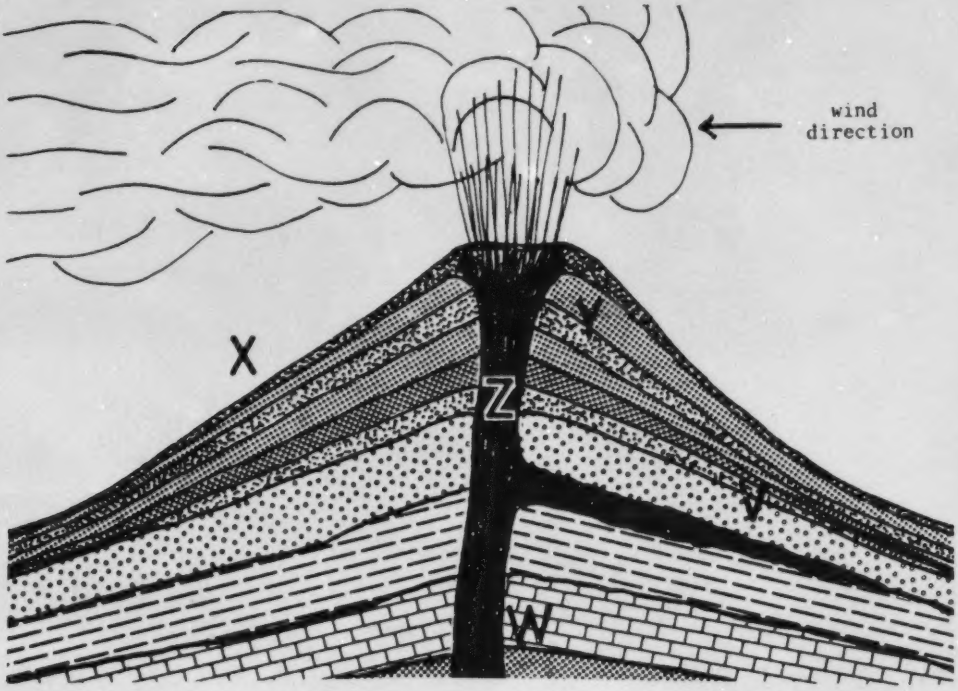
A. shale, slate, gneiss, schist.
B. granite, quartzite, slate, schist.
C. shale, phyllite, slate, schist.
C1 D. granite, gneiss, phyllite, schist. 152

Coral polyps grow rapidly in a warm ocean leaving great quantities of coral skeletons over millions of years. The coral skeletons become buried and millions of years later are intruded by a granite batholith. The rock produced from the coral skeletons in the immediate vicinity of the intrusion could be called

A. limestone. C. marble.
B. magma. D. quartzite. 153

STRUCTURES

The next six questions refer to the diagram below.



The igneous structure at V would be called a

B4 A. dyke. B. sill. C. vein. D. vent. 154

The rock at Y is likely to be

A. cross-bedded sandstone. C. volcanic breccia.
C1 B. mica schist. D. baked shale. 155

The material at X, which is flowing down the hillside, is best called

A. basalt. C. breccia.
D5 B. magma. D. lava. 156

The extent of metamorphism would be greatest in country rock near

B3 A. V. B. W C. X D. Y 157

The highest temperatures in molten rock would be measured near

D1 A. V B. X C. Y D. Z 158

The highest temperature in molten rock in the volcano would be about

D2 A. 100°C B. 600°C C. 1100°C D. 1600°C 159

The structure which shows evidence of the movement of strata along a fracture in the earth's crust is called

A. dip.
B. dyke.
C. fault.
D. strike.

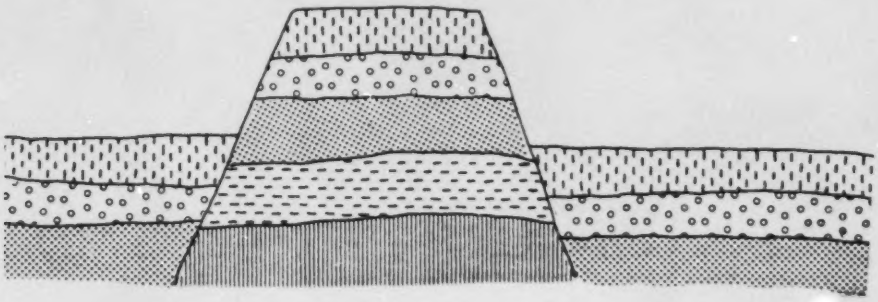
C3 160

A reverse fault is formed by

A. compressional forces in the crust.
B. alternate weak and strong beds.
C. vertical movements of the crust.
D. pressures due to intruding magma.

A1 161

The diagram below represents a cross-section of an *upthrown* block lying between two *downthrown* blocks.



This feature is called a

A. graben.
B. horst.
C. step fault.
D. reverse fault.

B1 162

Batholiths are large bodies of igneous rock formed when liquid rock or magma intrudes buried layers of rock. The most common rock type found in batholiths is

A. basalt.
B. granite.
C. porphyry.
D. sandstone.

B1 163

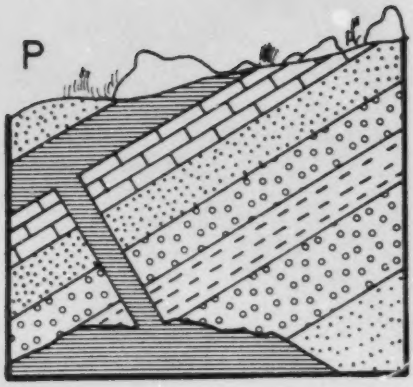
It has been observed that the Rocky Mountains of North America are gradually rising while at the same time they are being worn away by rivers. One theory to explain this movement involves blocks of the crust floating on mantle material. The block of crust rises as erosion wears it away and so maintains flotation equilibrium. This theory is known as

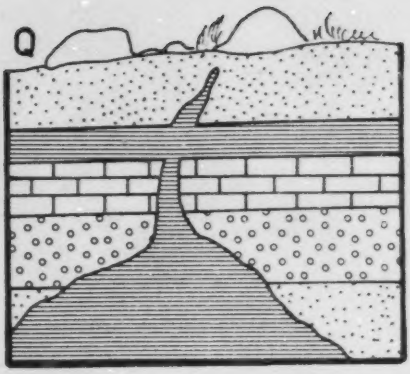
A. orogenesis.
B. geosynclinal activity.
C. isostasy.
D. continental drift.

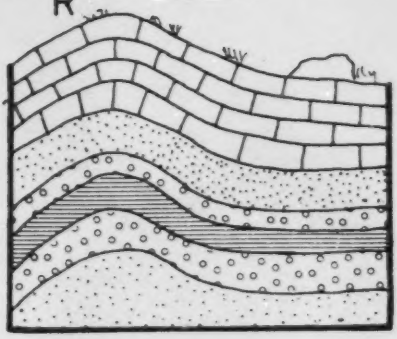
C4 164

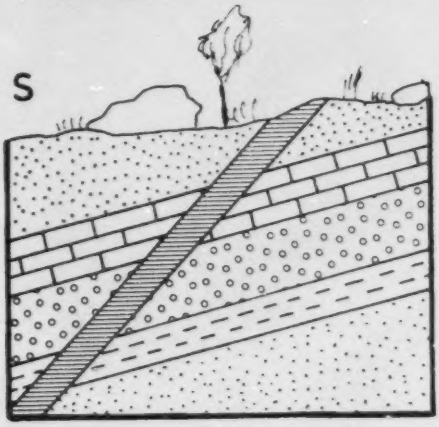
Between the shield areas of Central Australia and the coal producing basins of eastern Australia there are

A. large trenches filled with sedimentary rocks.
B. extensive belts of basalt flows.
C. belts of folded sedimentary rocks.

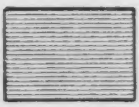








IGNEOUS ROCKS



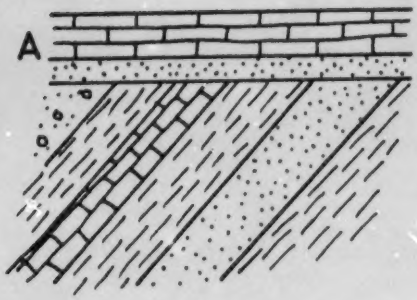
Which diagrams above contain one (or more) sills?

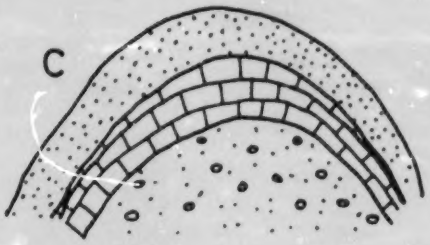
A. P and Q only.
B. Q and R only.
C. P, Q and R only.
D. P, Q and S only.

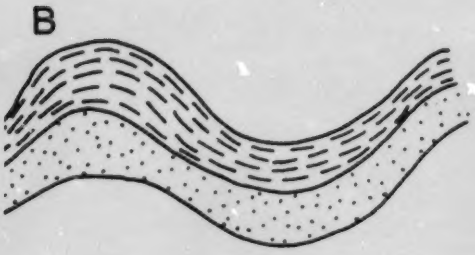
C.1

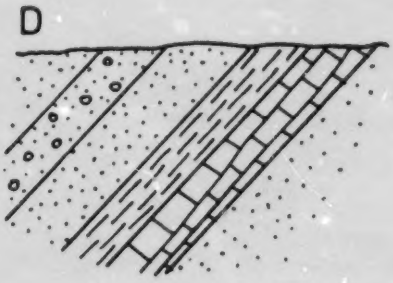
166

Which of the diagrams below shows an unconformity?

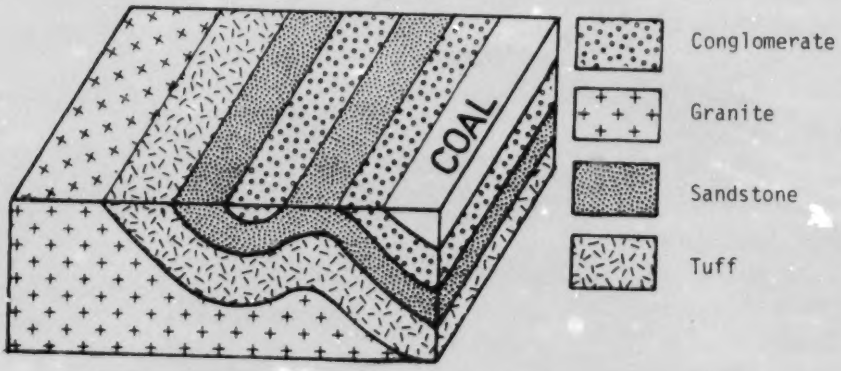








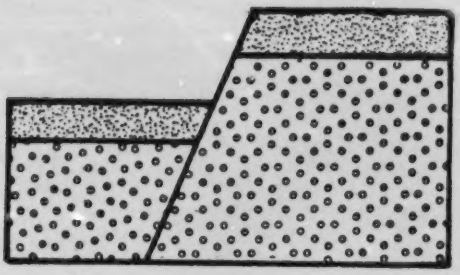
The next question refers to this geological block diagram.



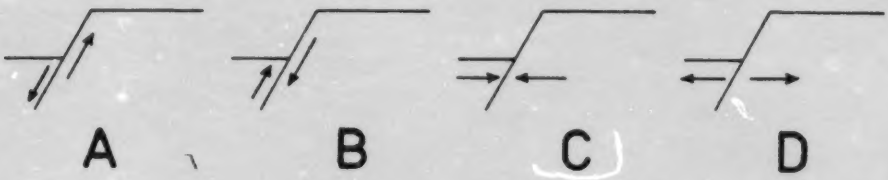
From all of the evidence available in the diagram, which of the statements below is correct?

A. The granite is the youngest rock.
B. The sandstone is folded into an anticline.
C. The conglomerate is older than the tuff.
D. The coal is the oldest rock shown in the diagram.

The next two questions refer to this diagram of a geological fault.



Which of the diagrams below shows the directions in which the two blocks moved when the fault was formed?



A5. 169

Which of the diagrams above shows the direction of the forces which produced the movement?

D1. 170

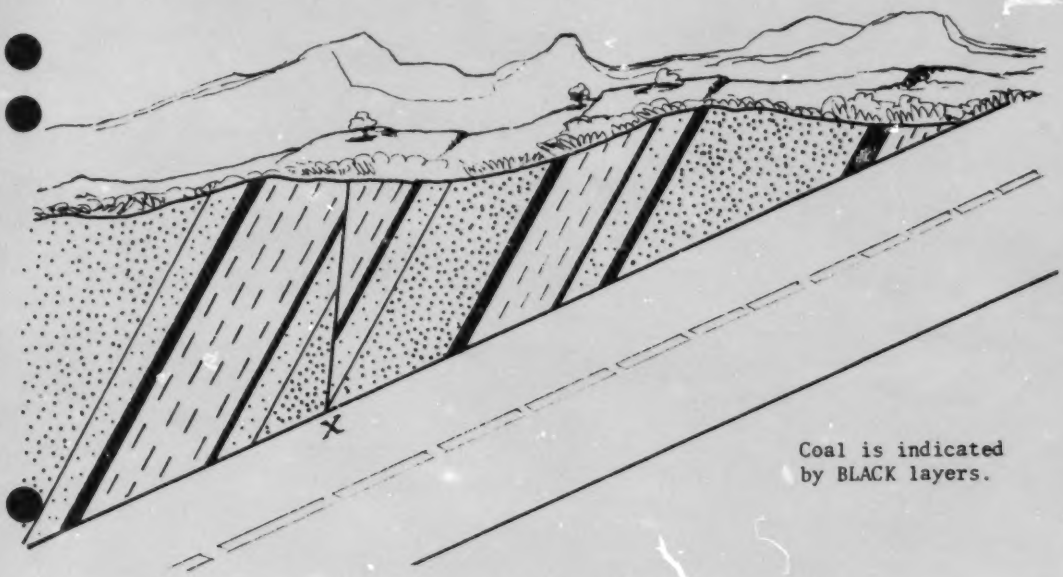
The next question refers to these four diagrams.

Of the four structures above, the one which could have been caused by stretching (tensional) forces in the crust of the earth is

A. 1 B. 2 C. 3 D. 4

D1. 171

The next three questions refer to this diagram of part of a road cutting in a coal producing region.



The type of rock between the coal layers is of sedimentary origin. Of the following statements the <u>one</u> which could <u>NOT</u> be correct is:

A. there are distinct layers in the individual sedimentary rocks.
B. there are deposits of soft clay-like rocks between some layers between the coal layers.
C. individual sand particles can be observed in several layers between the coal layers.
D. several layers between the coal layers are of rock which have been identified as granite.

172

D2.

These layers are tilted. This is most probably because

A. they were originally deposited at this angle.
B. road construction has disturbed the original position of the beds.
C. forces from within the Earth's crust have caused original horizontal layers to become tilted.
D. the road is inclined and only gives the impression of the layers being tilted.

173

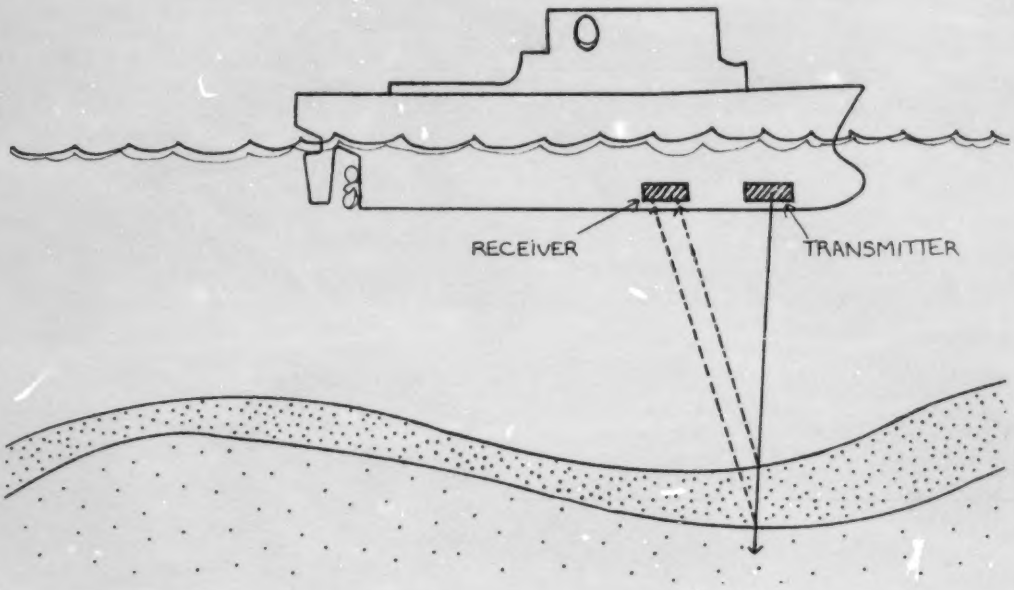
C5.

In part of the cutting the layers of coal are separated by a line (marked X) and are not continuous. The best explanation for this would be

A. the coal was formed at different times.
B. layers have cooled at different rates and caused the fracture.
C. pressure from opposite directions has caused movement along a line of weakness.
D. this is where a volcanic dyke has weathered away.

C3.

174



The diagram above shows a trawler fitted with a device used to determine the depth of the water. The device is called an "echo sounder". What is being transmitted to the bottom and being reflected back to the receiver?

A. Sound waves.
B. Light waves.
C. Electric current.
D. S-waves.

A5.

Two continental land masses drift slowly together over millions of years, and collide. The most likely result would be

A. splintered continents.
B. a large normal fault.
C. a range of fold mountains.
D. an oceanic trench.

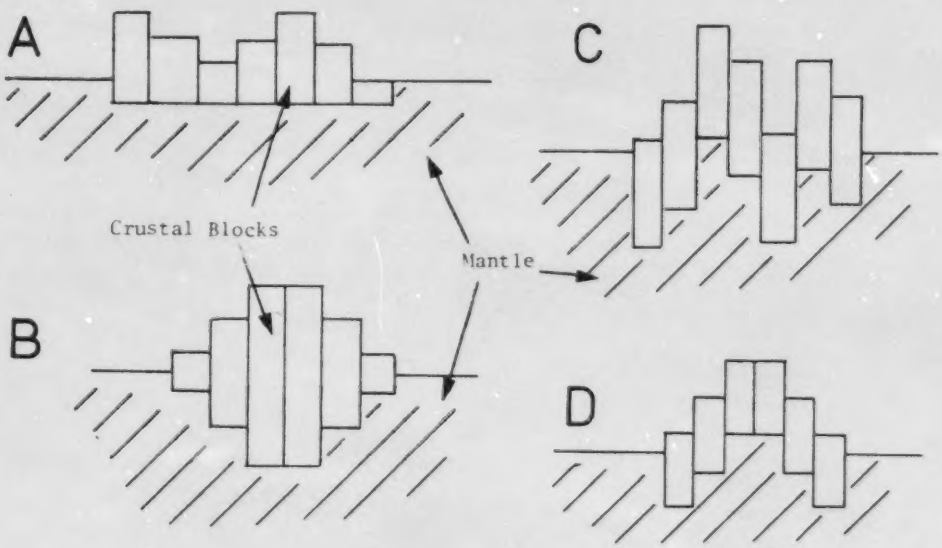
C2 176

Isostasy is the term used in connection with continents to express the idea that the continents are

A. drifting apart.
B. floating in the mantle.
C. thicker than the ocean floors.
D. composed of the densest rocks.

B1 177

One theory about the earth's crust likens it to icebergs. It considers it to be composed of blocks of earth floating in the mantle (semi-liquid rock). The higher the land above sea level, the lower it extends into the mantle.
Which diagram below best illustrates this theory?



B2 178

It is believed that the earth has a layered structure something like this:

Most of the evidence in support of this theory depends on which observation?

A. waves bend when they pass from one medium to another.
B. objects float on fluids of greater density.
C. igneous rocks are denser than sedimentary rocks.
D. pressure increases with depth below the surface.

A1

179

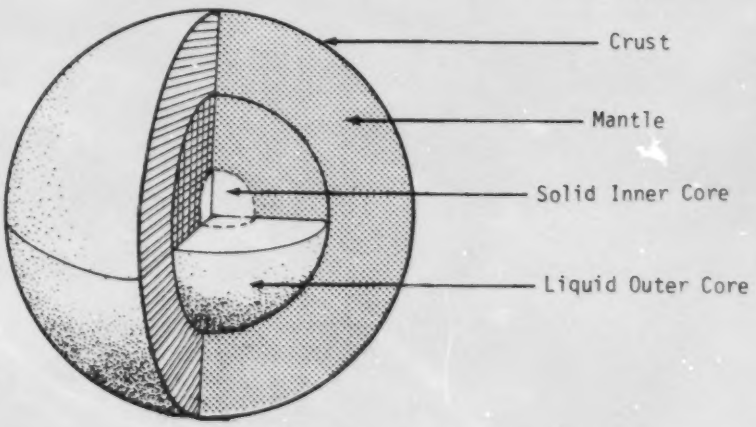
The Earth is believed to consist of an outer crust forming a thin layer outside a plastic mantle. At the centre is a liquid outer core and a solid inner core.
The source of evidence for this structure is

A. drill cores.
B. earthquake waves.
C. magnetic fields.
D. natural radioactivity.

B2

180

Our present knowledge of the Earth's structure can be represented by the following model.



We can be reasonably certain that

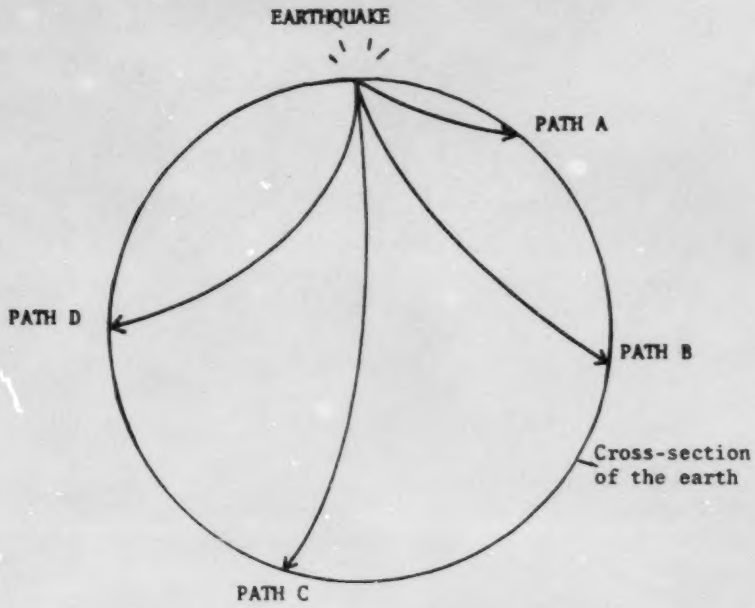
A. the same model would have been used 2000 years ago.
B. other planets in the solar system would have the same structure.
C. new evidence will change the model.
D. by the year 2000 the model will have changed.

C4

181

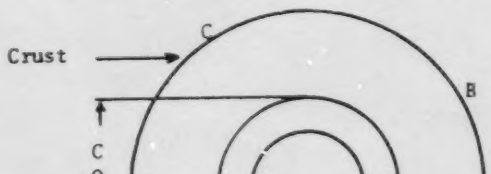
Because of problems with this page discovered during printing, a replacement will be issued separately, soon after the remainder of the volume. Please substitute in this location, in your ring binder.

Some earthquake waves will NOT pass through liquids. Which of the paths drawn below could NOT be taken by these waves?



C.3

The diagram represents a cross-section of the earth. Earthquake waves are travelling out from F.



Knowing that S waves cannot travel through liquids we would NOT expect to detect S waves at

A. A.
B. B.
C. C.
D. D.

B.3

Evidence to indicate that the centre of the earth consists of a solid core is most convincingly obtained from

A. density calculations.
B. increase of temperature with depth.
C. meteorites.
D3 D. seismic waves. 189

The point on the Earth's surface immediately above the point where an earthquake occurs is called the

A. epicentre. C. origin.
A3 B. focus. D. Moho. 190

The next question refers to the following map of South America.

The general trend of the earthquake epicentres is similar to the position of the

A. Andes mountain range.
B. Amazon River.
C. equatorial zone.
A4 D. desert regions in South America. 191

When seismic or earthquake waves pass through the earth they come to a boundary between the crust and the mantle where they change their speed. This boundary is known as the

A. core interface. C. Mohorovicic discontinuity.
C2 B. mid-ocean trench. D. seismic barrier. 192

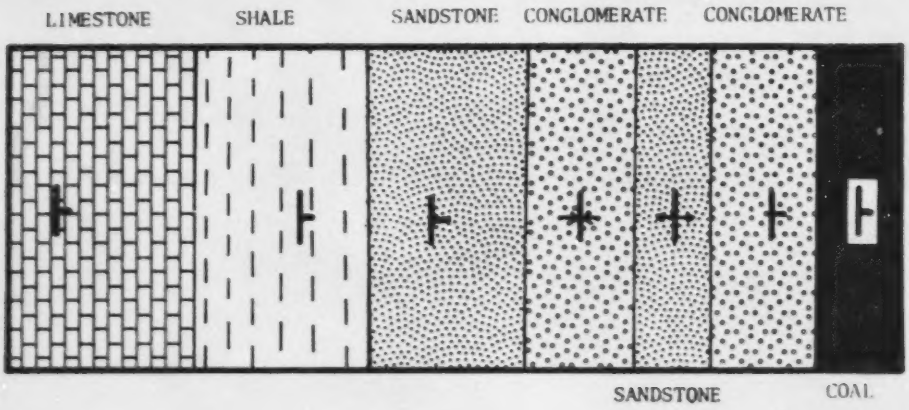
GEOLOGICAL MAPPING AND HISTORY FOSSILS

The next two questions refer to the following diagram.

B4 Which of the letters A, B, C or D correctly labels the SILL in the diagram? 193

C4 The DYKE in the diagram is labelled ___ (?) 194

Examine the geological map drawn below.

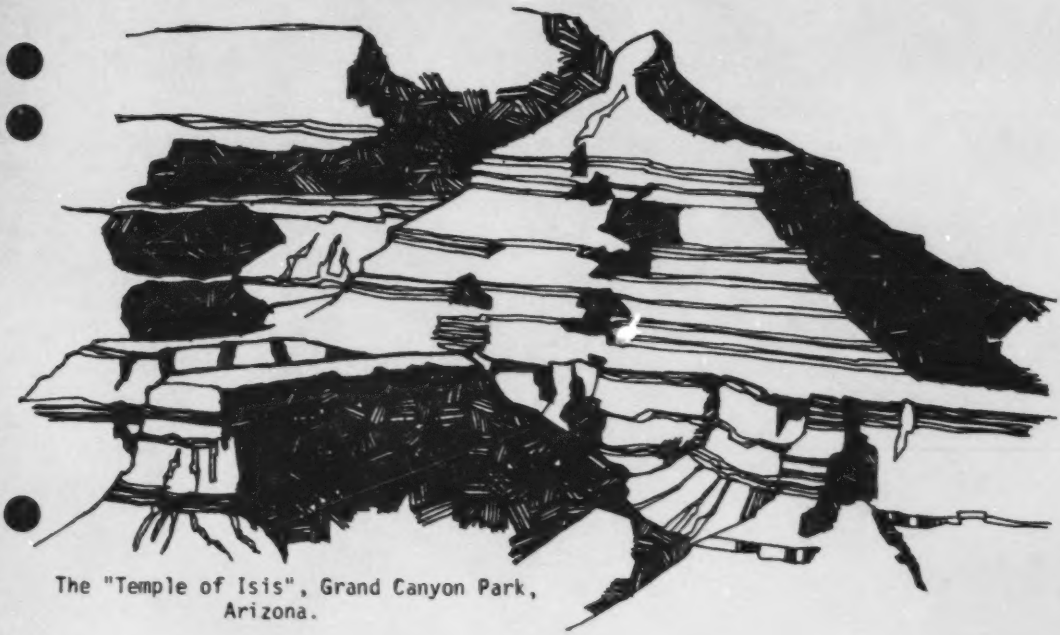


Which of the statements is correct?

A. Limestone is the youngest rock.
B. Sandstone is folded into an anticline.
C. Conglomerate is underneath the shale.

B1 D. Coal is the oldest rock. 195

The next question refers to the picture below.



The "Temple of Isis", Grand Canyon Park, Arizona.

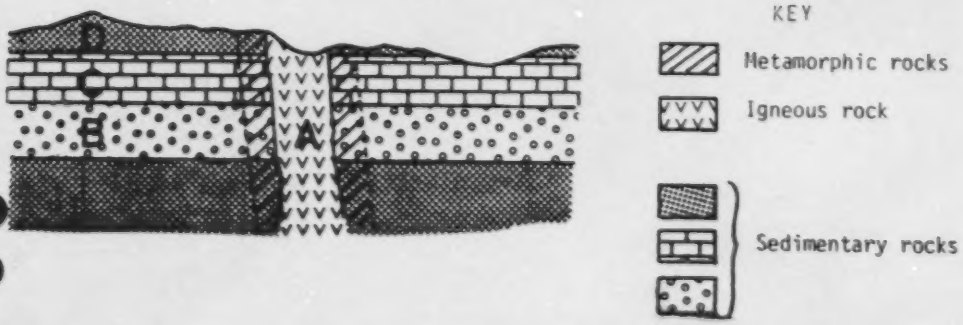
Look carefully at the above picture. Which of the following statements is most correct?

A. The oldest rock in the picture is at the top of the "Temple of Isis".
B. The rocks are laid down in order with the youngest at the bottom.
C. The river which cut the channel through these layers is younger than the rock layers.
D. Because there is no water in the picture, the erosion pattern must have been formed by the wind.

C3

19t

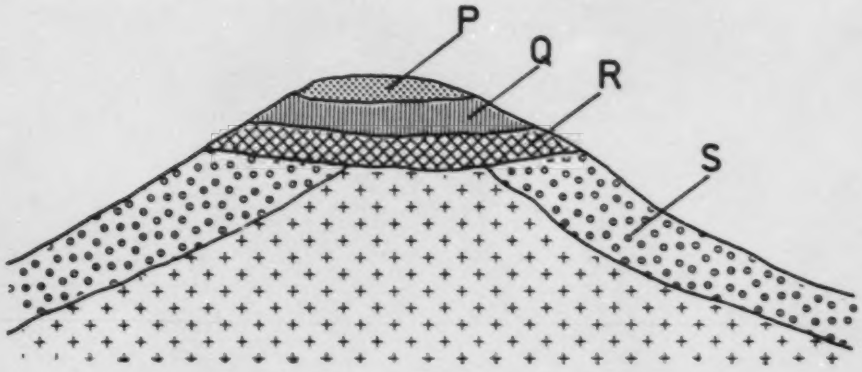
Look at the diagram below which shows a group of sedimentary rocks which have been intruded by a dyke.



A3 Which of the rocks labelled A,B,C, or D is the youngest?

19?

The next two questions refer to the following diagram which shows a geological cross-section of a hill.



In the above diagram the *boundary between beds* R *and* S represents

A. an anticline.
B. a block mountain.
C. an unconformity.
D. a monocline.

C.1

198

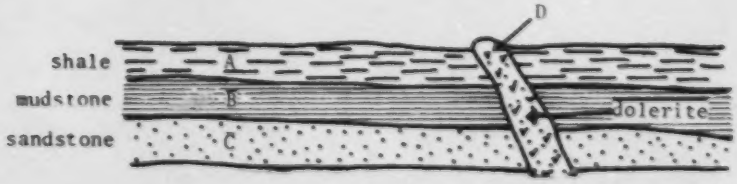
Of the four layers marked P, Q, R and S which would be the oldest?

A. P.
B. Q.
C. R.
D. S.

D.3

199

In the diagram below which rock (labelled A, B, C or D) is the youngest rock?

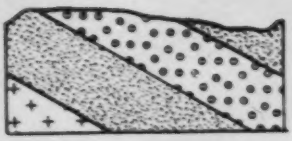


D3

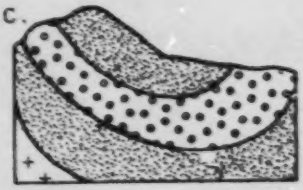
200

Look at the following rock sections all drawn to the same scale.

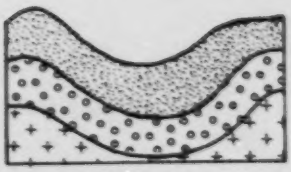
A.



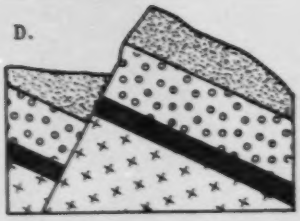
C.



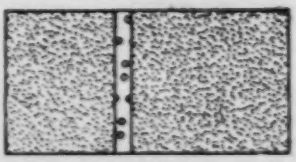
B.

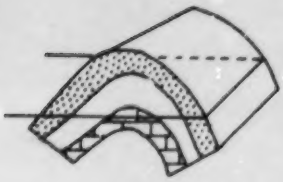
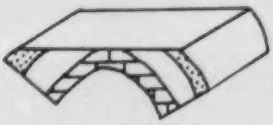
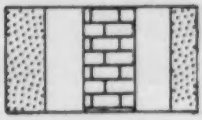


D.

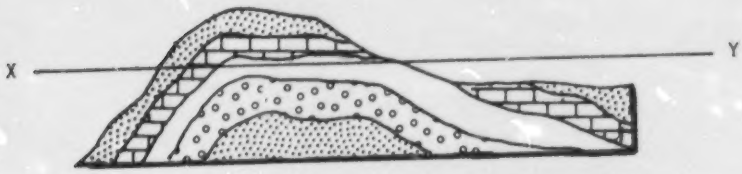


Which of the sections above (A,B,C or D) would look most like the diagram on the right if you looked down on the section from above.

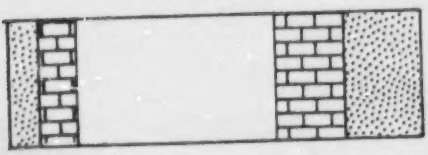


If  was cut through along the lines drawn to get  , then from above it would look like 

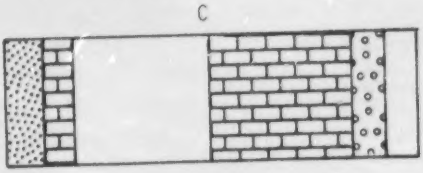
Which diagram below best shows what the surface would look like if erosion occurred to cut the hill drawn below down to the level of the line XY.



A

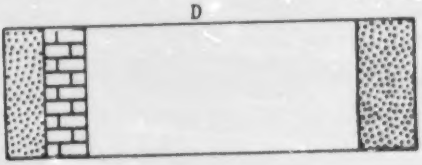


C

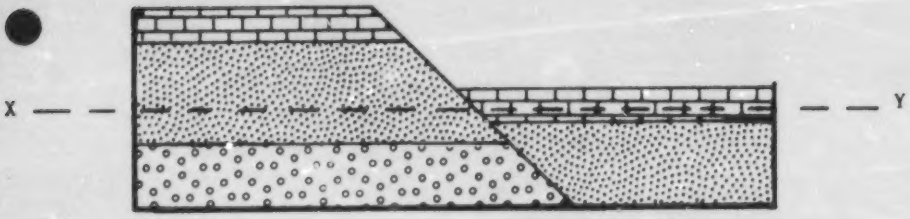


B

D

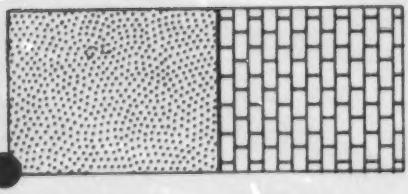


This question refers to this geological section.

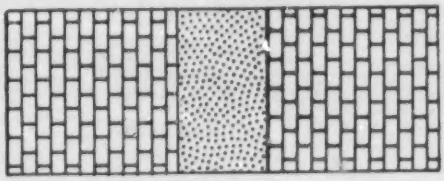


If the fault drawn above were to be eroded until the surface of the land was level with XY then the surface as viewed from above could look like

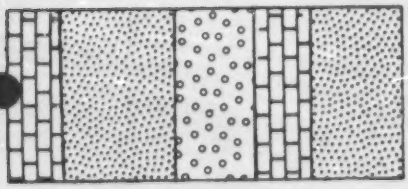
A



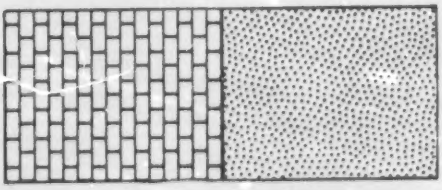
B



C



D



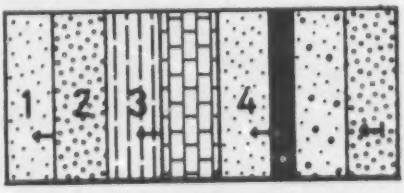
203

A4

Four drill holes were dug at the positions marked on the map. Which choice gives the correct order of the depth of the holes as coal is reached from most shallow to deepest?

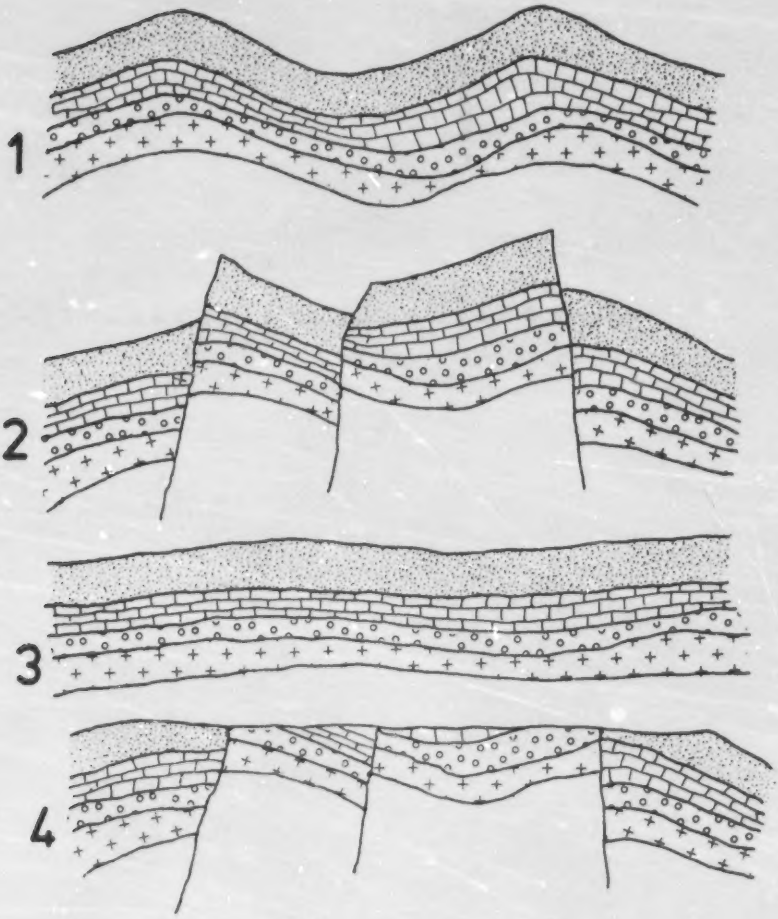
A. 1, 2, 3, 4.
B. 3, 2, 4, 1.
C. 4, 1, 3, 2.
D. 4, 3, 2, 1.

3



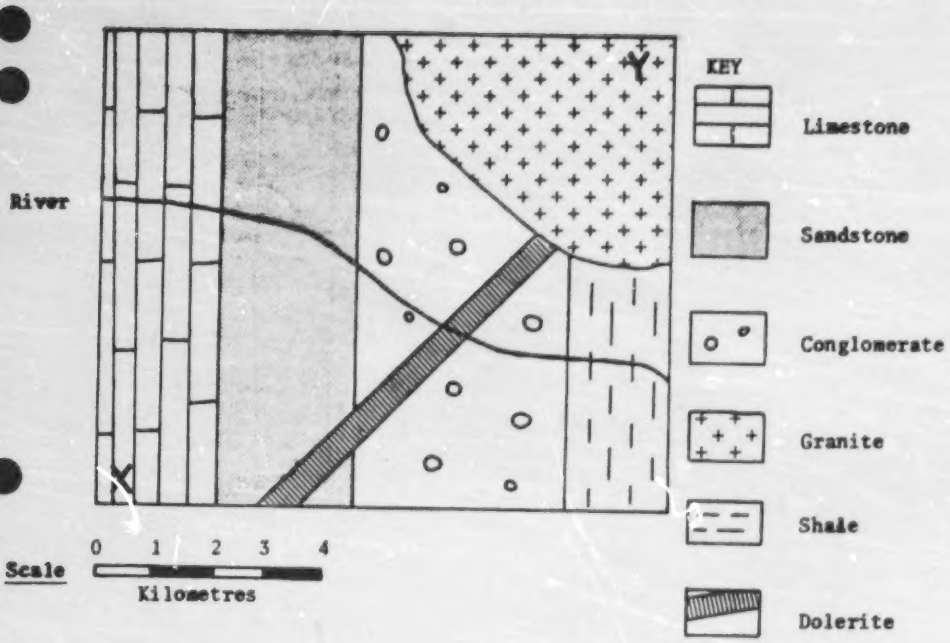
204

The four cross sectional diagrams shown indicate four stages in the geological development of an area.



The correct sequence of events from earliest to most recent was most probably

A. 1, 2, 4, 3.
B. 3, 2, 4, 1.
C. 1, 3, 2, 4.
D. 3, 1, 2, 4.



A geologist walking from point X to point Y made the following notes in his note book.
Which observation made by the geologist is incorrect?

A. After crossing 2 kilometres of limestone I found sandstone.

B. 5.5 kilometres from point X I had to cross a small river.

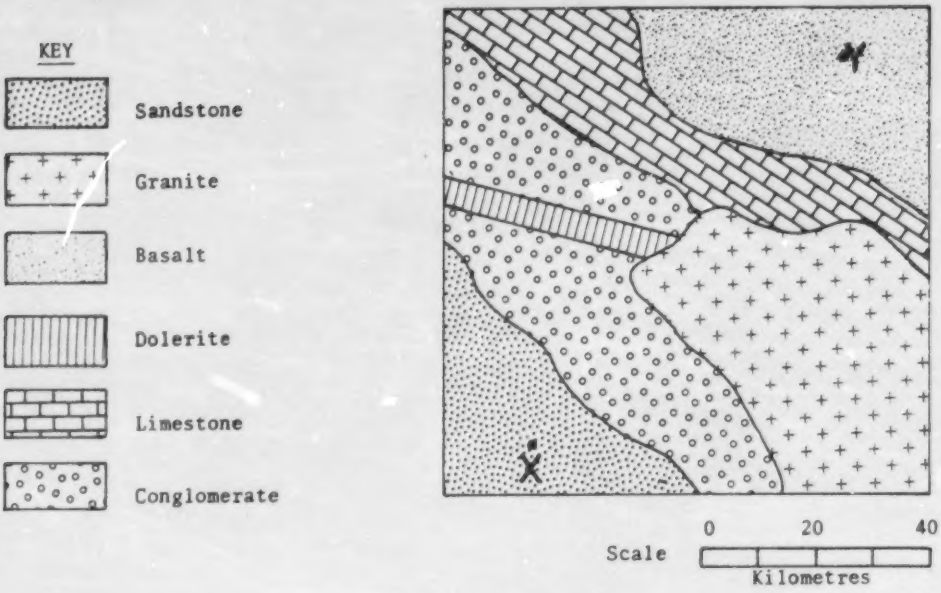
C. About 3 kilometres of conglomerate were crossed between X and Y.

D. After crossing the river I saw a dolerite dyke about 100 metres off to the right.

D.2

206

The next two questions refer to this geological map.



A man walks from X(bottom left) to Y(top right) in a straight line. After leaving X he then crosses (in order) the rocks

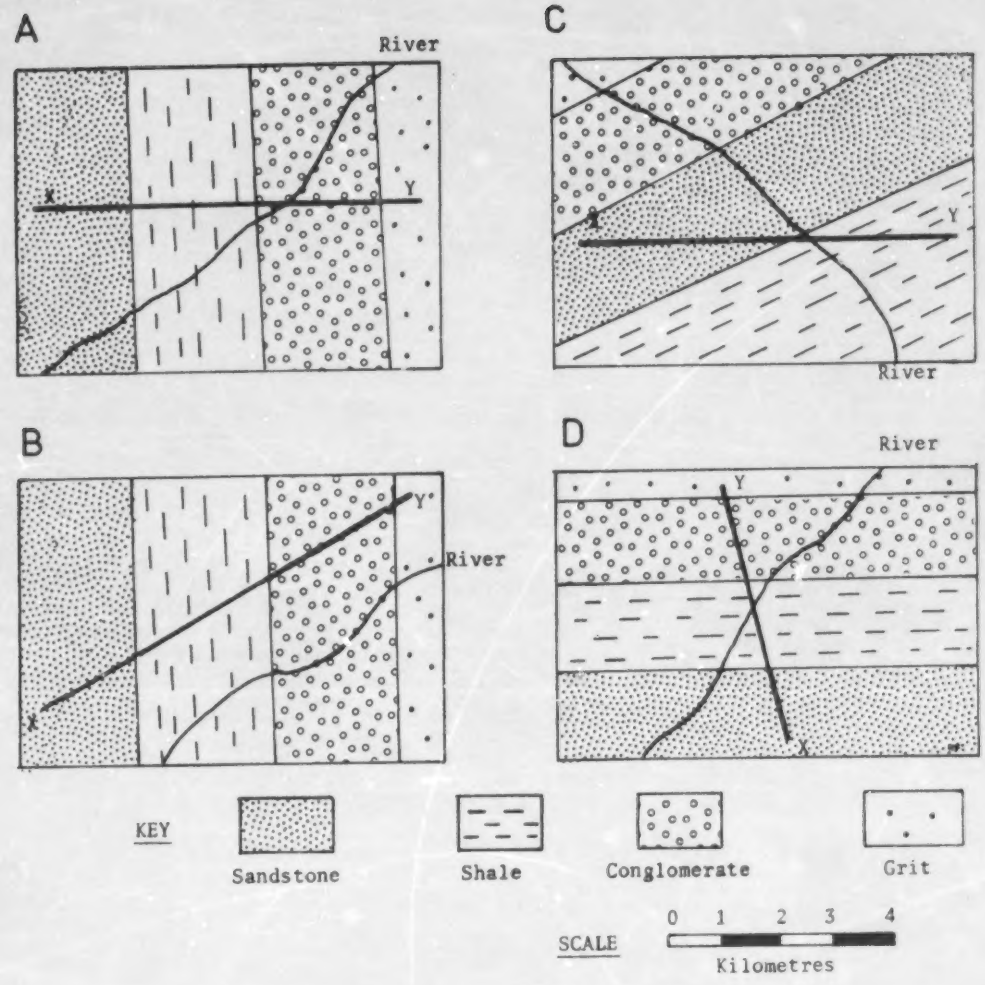
A. conglomerate, granite, limestone, basalt.
B. conglomerate, dolerite, limestone, basalt.
C. conglomerate, granite, dolerite, limestone, basalt.
D. conglomerate, dolerite, conglomerate, limestone, basalt.

207

How far does he walk before finding limestone? About

A. 15 km. B. 30 km. C. 55 km. D. 65 km.

208



A geologist walking from X to Y wrote in his field notes,

"after about 2 kilometres I found shale and could see trees marking the river about 1.5 kilometres off to my right."

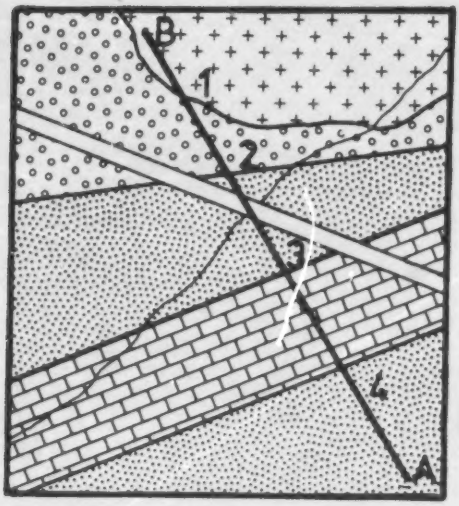
Which map was he most probably following?

A. B. C. D.

209

B3

The next question refers to this geological map.



River

Road

Sandstone

Limestone

Conglomerate

Granite

Scale 0 1 2 3 4

Kilometres

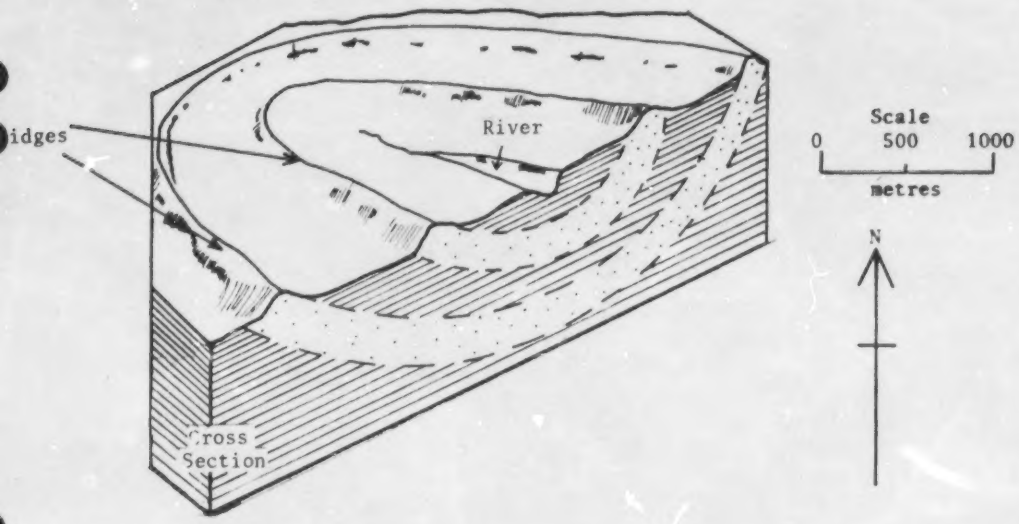
A geologist walking from A to B along the heavy line made the following observations while walking:

> "Directly ahead I could just see the bridge. While sitting on a large sandstone outcrop I could see trees marking the position of the river about 2.5 kilometres to my left."

Where was the man when he made these observations?
Closest to point

A. 1. B. 2. C. 3. D. 4.

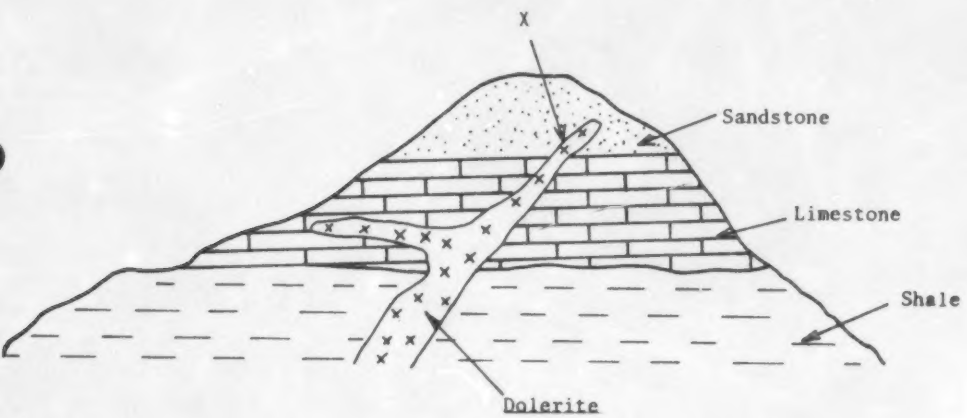
This question refers to the block diagram below.



The block diagram shows surface and cross-sectional features of

A. an anticline plunging to the north-west.
B. a syncline plunging to the south-east.
C. an anticline plunging to the south-east.
1 D. a syncline plunging to the north-west. 211

The next two questions refer to the diagram below.



From the diagram we can say that the age of the dolerite is

A. less than any of the others.
B. same as the limestone and shale, but less than the sandstone.
C. same as the sandstone, but greater than the shale.
2 D. greater than any of the others. 212

The metamorphic rock most likely to be found at point X is

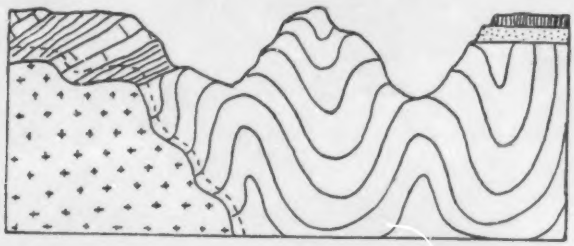
A. hornfels.
B. marble.
C. quartzite.
3 D. schist. 213

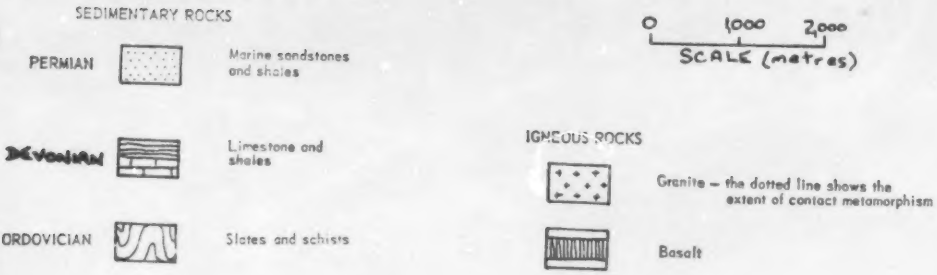
The presence of a layer of tuff in between beds of sandstone would indicate the occurrence, in the past, of

A. igneous instrusions.
B. mountain building.
C. outpouring of lava.
D. volcanic explosions.

214

The next two questions refer to the following diagram.





The earliest rocks formed were probably

A. granite.
B. limestone.
C. marine shales.
D. slates and schists.

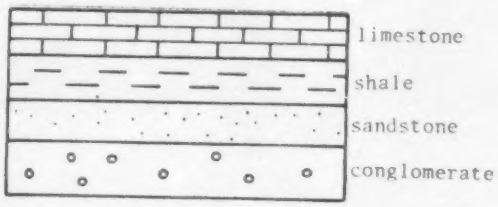
215

Which statement below is true?

A. The basalt is older than the sandstone.
B. The granite is younger than the limestone.
C. The slates and schists were folded after the intrusion of the granite.
D. Shale is older than the slates and schists.

216

A cliff face had the following layers of rock as shown in the diagram.



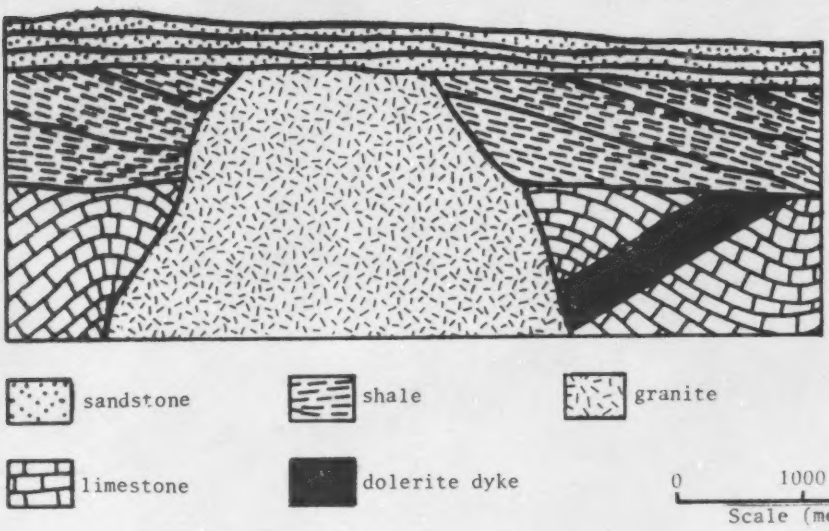
This sequence indicates

A. rapid climatic changes.
B. a receding coastline.
C. gradual changes from topic to mild conditions.
D. a stream becoming progressively more rapid.

77

217

The next three questions refer to the geological section below.



The number of distinct periods of deposition of sediment in the section above is

C2 A. 1 B. 2 C. 3 D. 4 218

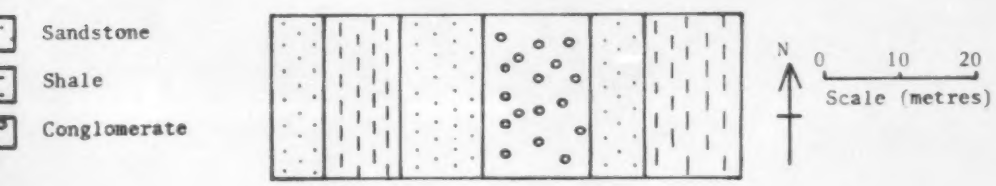
The dolerite dyke is

A. older than the granite but younger than the shale.
B. younger than the limestone but older than the granite.
C. older than the limestone but younger than the sandstone.
B2 D. younger than the granite but older than the sandstone. 219

A geological structure NOT depicted in the section is a(n)

A. anticline. C. igneous intrusion.
B3 B. fault. D. unconformity. 220

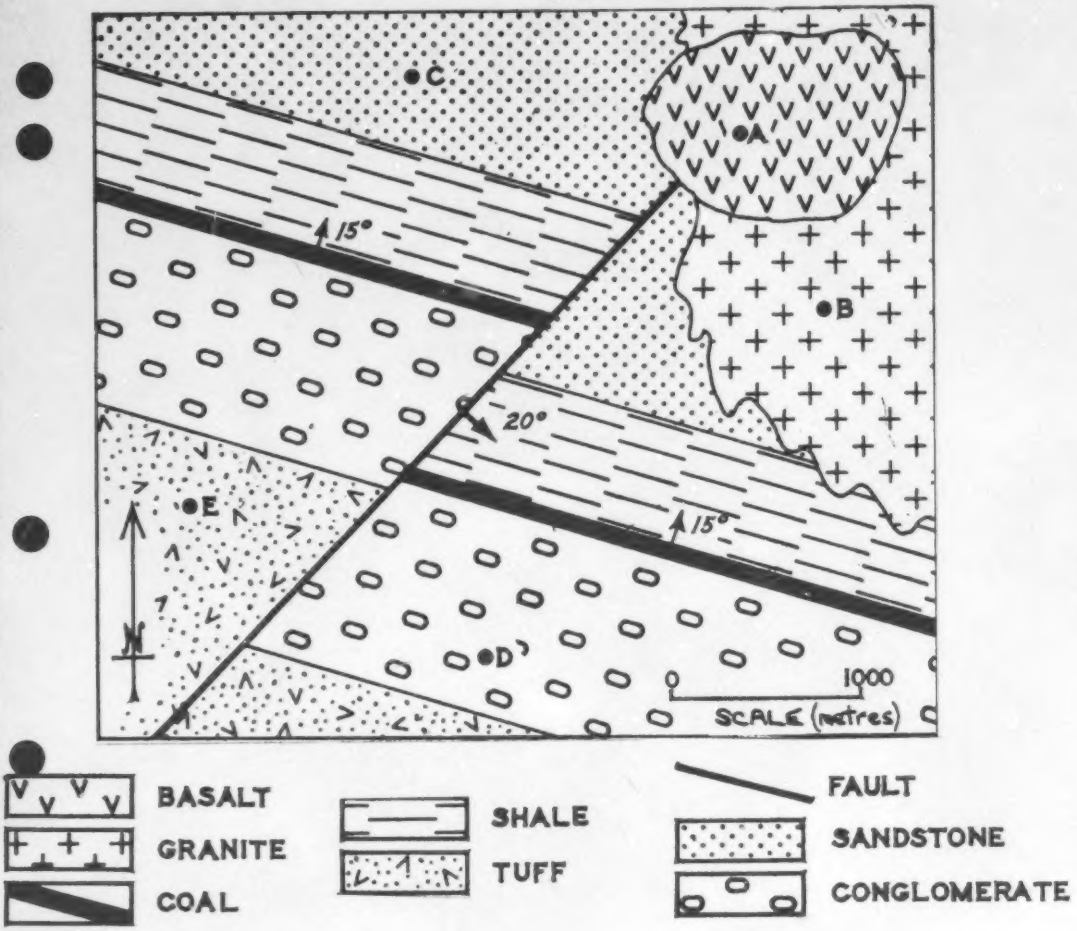
The next question refers to the diagram below.



The diagram above represents a geological traverse map. The map surface is horizontal.
The most unlikely interpretation of the geological structure present would be

A. a series of beds dripping to the west.
B. an anticline trending north-south.
C. a syncline trending north-south.
D2 D. a series of horizontal beds. 221

The next five questions refer to the geological map below



The oldest rock unit shown on the map is

A. conglomerate. C. sandstone.
D3 B. granite. D. tuff. 222

The youngest rock unit shown on the map is

A. basalt. C. sandstone.
A3 B. conglomerate. D. tuff. 223

In relation to the fault, the downthrown block on the map is

C1 A. NW B. NE C. SE D. SW 224

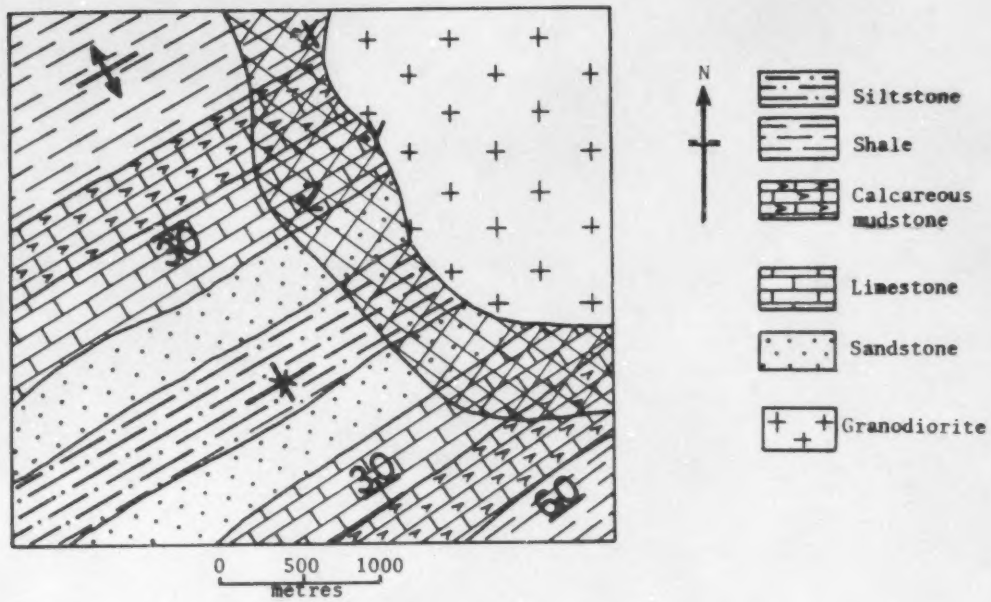
Drill cores were studied from drill holes A, B, C, D and E (marked on the map). You would expect to find coal seams in core(s)

A. C only. C. D and E only.
A1 B. B and C only. D. A, B and C only. 225

The shallowest intersection of coal in any of the five drill holes (A, B, C, D or E) would be at a depth of about

A. 50 metres. C. 800 metres.
B1 B. 300 metres. D. 2000 metres. 226

The next five questions refer to the geological map below.



The number of anticlines and synclines present in the map area is respectively

C3 A. 0, 1. B. 1, 0. C. 1, 1. D. 1, 2. 22

The oldest rock unit shown on the map is

A. granodiorite. C. shale.
C3 B. limestone. D. siltstone. 22

The hatched area on the map indicates the extent of the contact metamorphic aureole. Note the points X, Y and Z marked on the map.

The likely rock type outcropping at X would be

A. hornfels. C. quartzite.
A1 B. marble. D. shale. 2

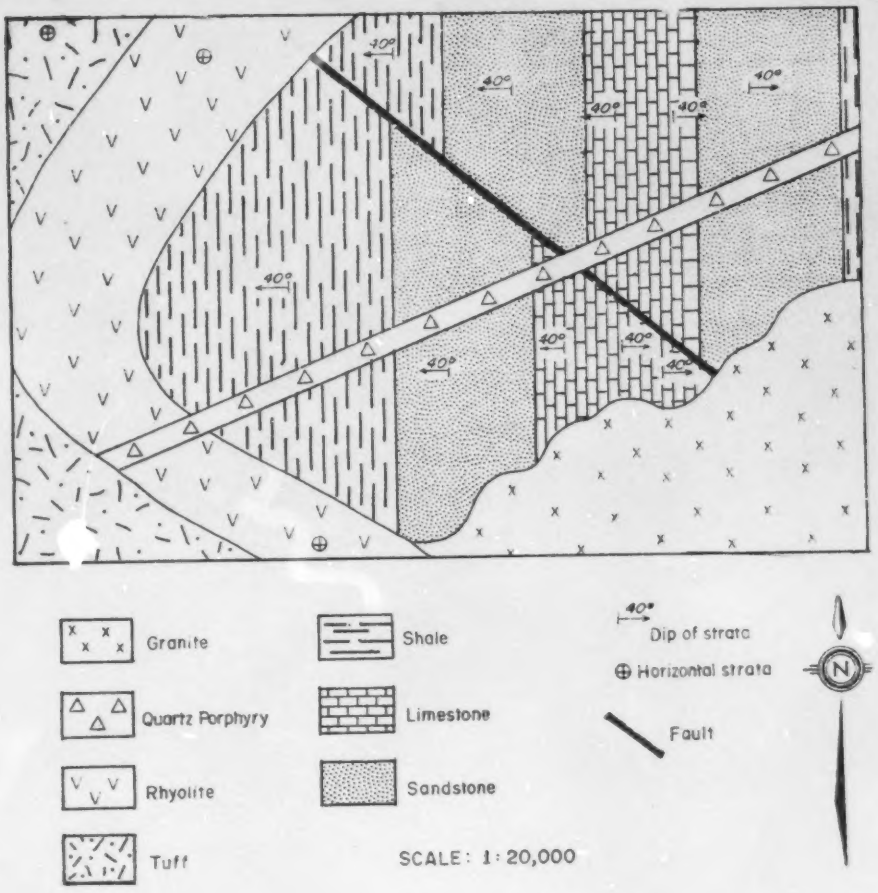
The likely rock type outcropping at Y would be

A. hornfels. C. marble.
C1 B. limestone. D. quartzite. 23

Comparing the rock types at Y and Z we would probably find that

A. rock Y would be darker in colour than rock Z.
B. rock Y would be coarser-grained than rock Z.
C. rock Y would be more porous than rock Z.
B1 D. rock Y would be finer-grained than rock Z. 23

The next five questions refer to the geological map below.



The oldest rock type on the map is the

A. granite.
B1 B. limestone.
C. rhyolite.
D. shale.

The youngest rock type on the map is the

A. limestone.
D3 B. quartz porphyry
C. shale.
D. tuff.

Faulting in the area occurred

A. before deposition of shale but after intrusion of granite.
B. before deposition of tuff but after intrusion of porphry.
C. before extrusion of rhyolite but after deposition of sandstone.
D. before intrusion of granite but after deposition of tuff.

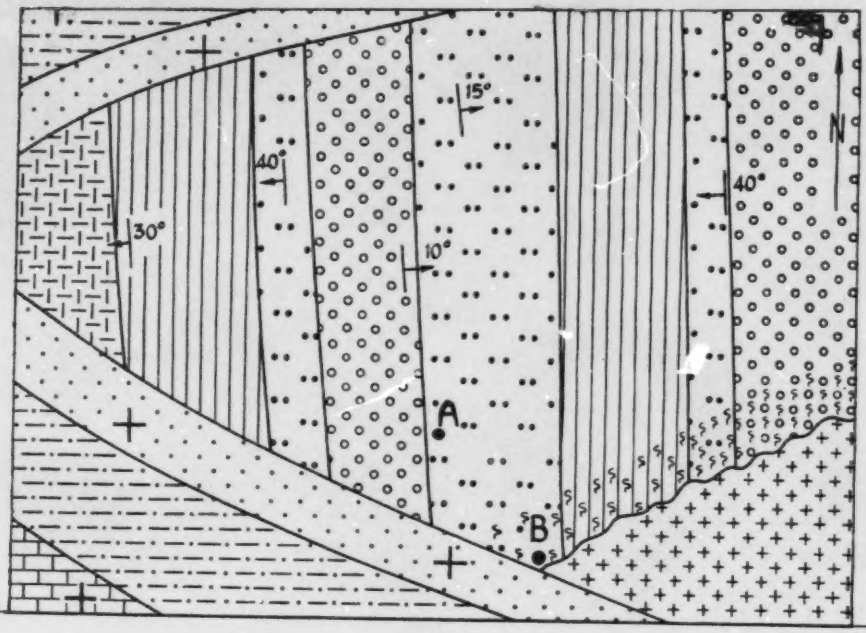
The geological structure NOT present in the map area is a(n)

A. anticline.
C1 B. dyke.
C. syncline.
D. unconformity.

The thickness of the sandstone is about

A. 5 metres.
C2 B. 50 metres.
C. 500 metres.
D. 5000 metres.

The next six questions refer to the geological map below.



The number of anticlines indicated on the map is

B1 A. 0 B. 1 C. 2 D. 3 237

The oldest rock type shown on the map is

A. conglomerate. C. shale.
A1 B. granite. D. siltstone. 238

239

Note the points A and B marked on the map.
The difference between rock speciments taken from outcrops at A and B would be in

A. texture and hardness. C. cleavage and texture.
B. hardness and cleavage. D. texture, hardness and cleavage.

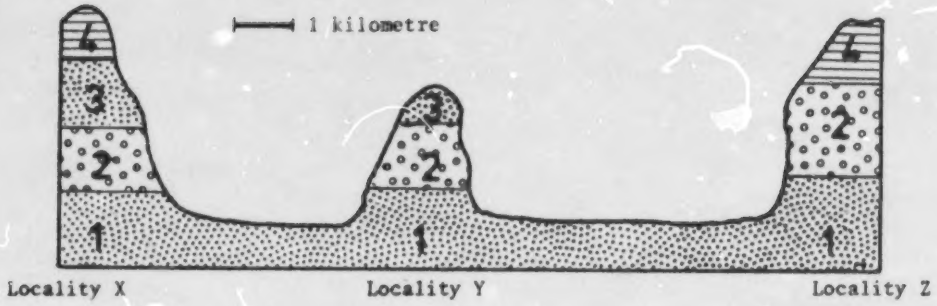
The thickness of the shale (in metres) is nearest to

B2 A. 500 B. 1000 C. 1500 D. 2000 240

The geological structure NOT present in the map area is

A. a syncline. C. an unconformity.
D3 B. a lava flow. D. a dyke. 241

This question refers to this geological cross-section.



Rock type 3 does not appear at locality Z but it does at X and Y.
Several reasons for this have been stated -

I. Locality Z is too far from X and Y for the right conditions to form rock 3.

II. Rock 3 was eroded from locality Z before rock 4 was formed.

III. Rock 2 has formed thicker beds at locality Z so it was too high up to get rock 3 on top of it.

Which reasons are most likely to explain rock 3's absence from locality Z?

A. I only.
B. II only.
C. I and III only.
D. II and III only.

B.1

242

Coral does not grow in the ocean at depths below 100 metres. However dead coral reefs have been found at depths of 300 metres in the ocean. This information supports the idea that

243

A. the land surface has eroded.

B. underwater volcanic activity has occurred.

C. the amount of ice at the poles has increased.

D. the crust of the earth has moved.

OR

D3.

Coral does not grow below depths of about 100 m. However, old dead coral reefs occur at depths of 300 m in the ocean. It is possible to use this information to support the idea of

A. erosion of the land surface.

B. volcanic activity.

C. movements in the earth's crust.

D. evolution of living things.

C3.

244

The next question refers to this table:

Geological Period	Duration (Mill. years)
Recent	< 1
Pleistocene	1-2
Tertiary	2-65
Cretaceous	65-105
Jurassic	105-145
Triassic	145-195
Permian	195-225
Carboniferous	225-275
Devonian	275-310
Silurian	310-335
Ordovician	335-390
Cambrian	390-500
Precambrian	500-3000

From this table we can say that the Permian period of geological time occurred before the

A. Carboniferous and after the Triassic .

B. Triassic and later than the Devonian.

C. Jurassic and before the Devonian.

D. Silurian and after the Devonian.

B1.

245

The theory of uniformity states that deposits in the past were formed in the same way as deposits are being formed at present. If an ancient coral deposit is found we could suggest that the area was once

A. near the mouth of a large river.
B. part of a large reef.
C. part of a deep ocean trench.
D. a warm, shallow sea. 246

Most fossils are found in rocks which formed in shallow seas or lakes. The reason for this is that

A. more kinds of animals live in water than on land.
B. remains are buried quickly in shallow seas and lakes.
C. rocks formed above water level are very uncommon.
D. animals dying on land are quickly eaten by others. 247

The following are four finds made by geologists when searching for fossils in different localities.

Locality	Fossils Found
A	the jaws and teeth of a small dinosaur
B	the foot bones and hoof of a small horse
C	some fossil feathers.
D	the skull of an ape-like creature.

At which locality would the oldest rocks most probably be found? 248

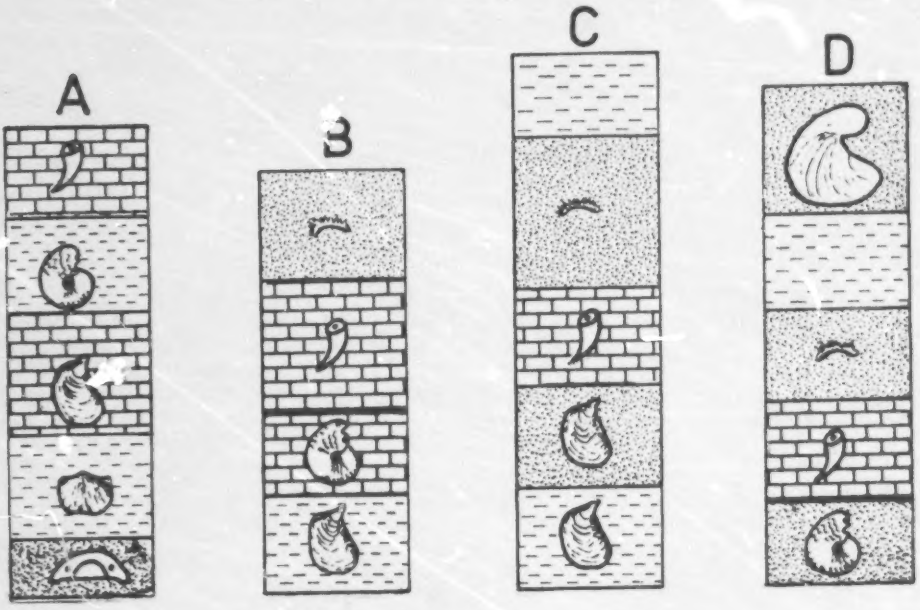
The next question refers to the following information.

A geologist was attempting to determine the origin of a particular rock strata in a cliff. He proposed an hypothesis from evidence he found in other rocks of the cliff face, that the strata were of marine origin.

In further work he located a fossil brachiopod, in the same strata. The geologist should be

A. pleased that his hypothesis was probably correct since brachiopods were fish which only lived in the ocean.
B. disappointed that his hypothesis was probably incorrect since brachiopods were land-dwelling vertebrates.
C. pleased that his hypothesis was probably correct since brachiopods were marine invertebrates.
D. disappointed that his hypothesis had not been strengthened by the evidence of this fossil. 249

A geologist found fossils in layers of rocks at four different sites. He mapped the layers and fossils as shown below.



Which of the localities bears the oldest fossils?

A3. 250

Which of the following provides the best reason why organisms which live in water tend to form fossils more easily than those which live on land?

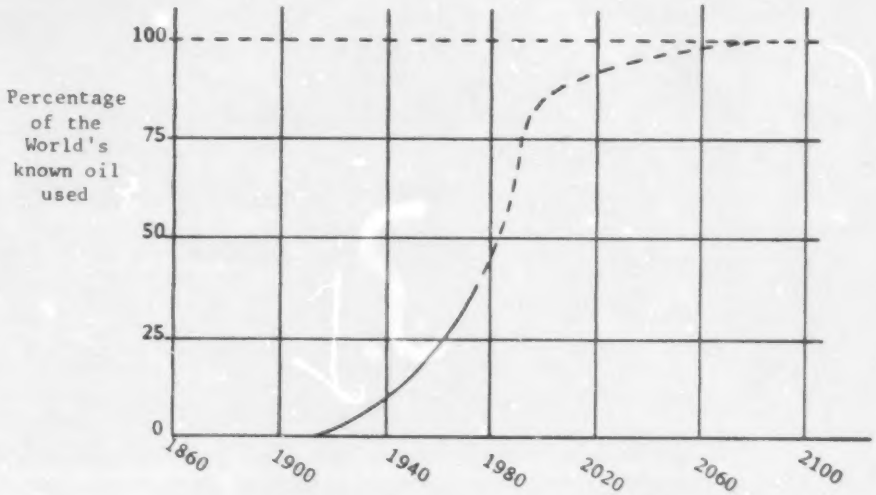
A. They occur in greater numbers than land organisms.
B. It is easier for them to be embedded in rocks.
C. They are quickly buried by sediments when they die.
D. Sedimentary rocks are formed in watery environments.

C.3 251

RESOURCES

The next two questions refer to the following information.

Present day geologists have estimated that about one quarter of the world's known crude oil reserves was used up between 1910 and 1970. Before 1910 there was virtually no use of crude oil. These facts are represented by the firm line in the graph below. The dotted line represents present day geologists' predictions of the future rate of consumption of the world's remaining known reserves.



According to the graph, the predicted percentage of the world's known reserves which will have been used by the year 2000 is

A. 50% B. 75% C. 85% D. 100%

C3.

252

By what year does the graph indicate that all of the world's known oil reserves will be used?

A. 1990 B. 2000 C. 2060 D. 2080

D5.

253

The naturally occurring substances from which many metals can be chemically extracted are called

A. alloys.
B. elements.
C. ores.
D. sedimentary rocks.

C.3

254

Of the following important raw materials, which one has been derived entirely from non-living material?

A3
A. Clay.
B. Coal.
C. Limestone.
D. Petrol.

255

Petroleum and natural gas are most commonly found in

A. areas of folded sedimentary rocks.
B. volcanic areas.
C. highly metamorphosed rock areas.
A2 D. mountain regions containing granite.

256

Wise management of fossil fuels is important to man because such fuels

A. are virtually inexhaustible.
B. cause less pollution than nuclear fuels.
C. are being made at the same rate that they are being used.
D3 D. are formed over millions of years.

257

Gemstones such as ruby, sapphire and diamond are highly valued in our modern society. Apart from colour, two of the physical properties of these gemstones which contribute most to their high value are

A. hardness and cleavage.
B. hardness and optical properties.
C. streak and cleavage.
B3 D. streak and optical properties.

258

Read the following passage and then answer the three questions below.

> "The 1950's to the 1970's will be remembered in Australian History as the years of the great mineral boom. In this period the world's largest single bauxite (aluminium ore) deposit was discovered in Queensland, the world's richest uranium field was discovered in the Northern Territory and mountains of iron ore were discovered in Western Australia. These were only a few of the many discoveries, there will probably be many more. There have been other boom years in Australia's history. Such a time was back in the 1850's when gold was discovered in the colony of Victoria."

The world's largest deposit was discovered

A. before 1850.
C5 B. before 1950.
C. after 1950.
D. after 1970.

259

Uranium was discovered in

A. Queensland.
B. Northern Territory.
C. Victoria.
D. Western Australia.

260

The article says that gold was discovered in

A. Victoria after 1850.
B. Victoria before 1850.
C. Western Australia after 1850.
A5 D. Western Australia before 1850.

261

The next four questions refer to this information.

A committee is trying to select the best way of generating electricity in the Ugly Islands. They have four different methods which they are considering, and they have asked an expert for the answers to four questions. The four methods are

A. burning coal.
B. using solar cells.
C. using a nuclear reactor.
D. burning wood.

Choosing from A, B, C and D above, what would be the answers of the expert to these questions?

Which method *does not* involve generating steam?

B2. 262

Which method uses a fossil fuel?

A4. 263

Which method produces the *most dangerous* wastes?

C5. 264

Which method costs the *least* after it is set up?

B3. 265

Four energy sources which are used now, or which are likely to be used in the future are coal, oil, uranium and solar power. The next three questions refer to these energy sources.

How many of the sources can be called "fossil energy"?

A. None. B. One. C. Two. D. Three.

C3. 266

In terms of the next thousand years or so, how many of the sources may be regarded as renewable?

A. One. B. Two. C. Three. D. Four.

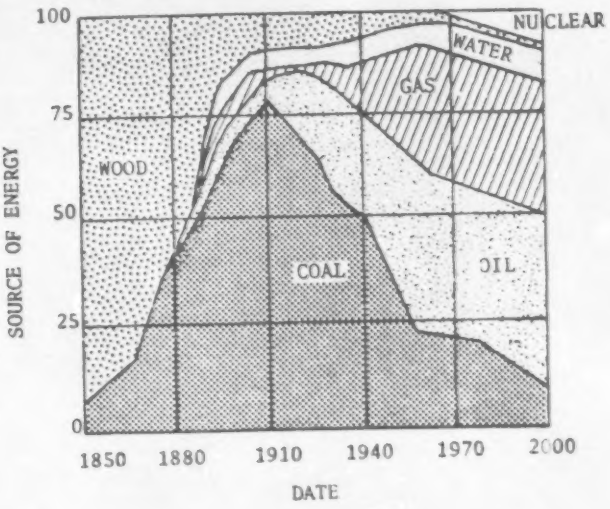
A2. ?

Which source causes the LEAST amount of pollution?

A. Coal. B. Oil. C. Uranium. D. Solar power.

D5. 268

The next question refers to this diagram.



The diagram shows the % of energy used on earth as the source of the energy for the years 1850 to 2000 (predicted). The diagram shows that

A. burning wood was the only source of energy before 1850.
B. in 1940, coal supplied about 50% of the energy used.
C. nuclear energy wasn't discovered until about 1960.
D. the coal reserves of earth have been decreasing since 1910.

B2. 269

The next question refers to this cartoon.

The situation in this cartoon could most suitably be compared to

A. the shortage of housing in the world.
B. the dwindling supplies of fossil fuels in the world.
C. man's inability to warm himself.
B4 D. the approaching ice age in the northern hemisphere. 270

The following statement refers to an energy source:
"There are no machines, no burning to pollute and no extraction process."
Of the following the most likely energy source is

A. coal and coke.
B. petroleum.
C. uranium.
D. underground steam.

D4. 271

The fuels used by man for cooking include wood, oil, coal, and gas. The thing which these have in common is that they all

A. will run out by the year 2000.
B. are renewable resources.
C. are fossil fuels containing chemical energy.
D. release carbon dioxide when they are burnt.

D3. 272

D. West, Government Printer, New South Wales – 1981